BENDIX: The First Production Digital Fly-By-Wire Flight Control Computer System

The Bendix digital fly-by-wire flight control computer system will be the first installed in a production fighter aircraft. Extensive experience with flight control equipment, including one year of failure free flight testing on AFTI/F-16, combined with the latest in technology, capabilities and facilities makes Bendix the ultimate source for digital flight controls both today and in the future.

Bendix is proving that an effective transition can be made from state-of-the-art technology to full production hardware and software while maintaining quality, meeting deadlines and keeping to budget.

Contact us. Let us discuss your future mission with you.

Bendix Flight Systems Division
Route 46, Teterboro, New Jersey 07608. USA
Tel. 1-201-393-2140,
Telex: 13-4414 (BENDIX TTBR)

ALLIED Bendix Aerospace

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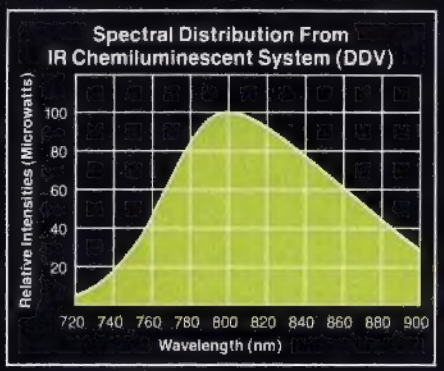
Infrared CYALUME® Lightsticks Shedding new light on night vision technology

Weighing less than 2 ounces, unbreakable and activated manually in seconds for field use as a non-visible light source detectable by night vision systems, Cyanamid's infrared CYALUME® Lightstick has been developed in close cooperation with the U.S. military.

Designed for nighttime operations.
Clearly visible for a full 90 minutes through night vision gear, the unique, 6 inch long, non-toxic, non-flammable, spark-proof Lightstick was designed specifically for military applications, such as helicopter landing sites,drop zones, personnel and vehicle markers, surveillance, supply drop markers, signaling, — the list is virtually endless.

Technically speaking...
The non-visible CYALUME® Lightstick emits infrared light detected only with the use of night vision devices. Activation causes a chemical reaction, which emits light in the near infrared region (700-950 nm) and peaks at 800 nm.



This emission is detectable by nearly all night vision lenses, scopes and goggles available today.

Get the full story now.
Infrared CYALUME® Lightsticks are available to the military and government agencies. National Stock Number: 6260 01 195 9752.
For further information, contact Bob Cozzo, Military Sales Manager, American Cyanamid Company, Chemical Light Department, One Cyanamid Plaza, Wayne, NJ 07470, (201) 831-3179.

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READY FOR INSPECTION:

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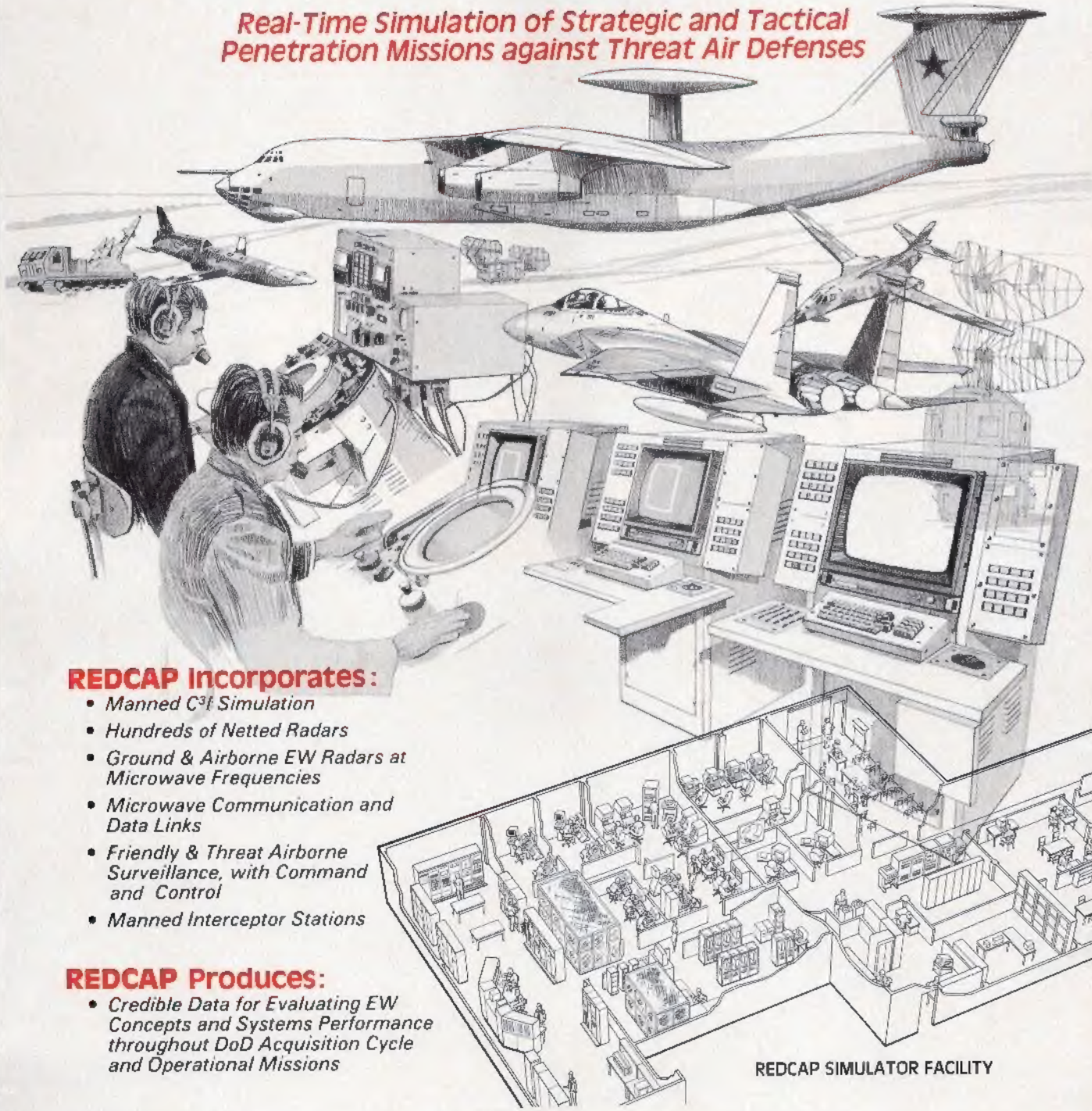
Real-Time Simulation of Strategic and Tactical Penetration Missions against Threat Air Defenses



REDCAP Incorporates:

- *Manned C³I Simulation*
- *Hundreds of Netted Radars*
- *Ground & Airborne EW Radars at Microwave Frequencies*
- *Microwave Communication and Data Links*
- *Friendly & Threat Airborne Surveillance, with Command and Control*
- *Manned Interceptor Stations*

REDCAP Produces:

- *Credible Data for Evaluating EW Concepts and Systems Performance throughout DoD Acquisition Cycle and Operational Missions*

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REDCAP is Fully Supported by Calspan's Air Defense Models and Analysts

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Meets The Test Of Truth

The best way to learn how to win tomorrow's battles is to fight them today. The best way to do *that* is by large-scale simulation of conflict, with real people fighting realistic battles under tightly controlled, fully instrumented, field operations test conditions. Wherever you find this taking place, you will likely find BDM at work.

BDM's test, evaluation, and instrumentation expertise are exemplified in MAFIS (Mobile Automated Field Instrumentation System), designed to collect and control information from instrumented Army tests involving more than 2,000 players. BDM helped engineer MAFIS and serves as systems integrator. BDM also puts hardware systems to the test . . . more than 25 major systems for the Air Force alone in a typical year. Operational testing and systems evaluation are carried out, too, for the Army, Navy, defense agencies, and joint service groups . . . with BDM helping plan, design, and conduct tests and exercises involving vehicles, aircraft, missiles, and space systems.

If you need to know how tomorrow's conflicts will turn out, turn to BDM today. Put *us* to *your* test. BDM International, Inc., 7915 Jones Branch Drive, McLean, VA 22102. Phone (703) 848-5000. Telex 901103.

MANAGING THE COURSE OF CHANGE

BDM

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AIR FORCE SUPPORT MISSIONS: THE BEECHCRAFT C-12J TAKES ON MORE.

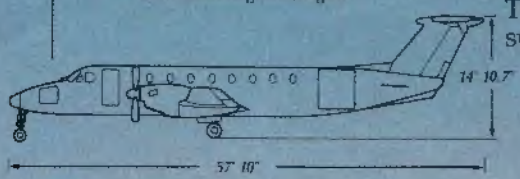
Mission capability: 19 passengers or 5300 lbs. of cargo. And, with all that, comes proven operational versatility and readiness reliability.

Worldwide Air Force commitments mean worldwide air support. It's a heavy load, but the Beechcraft C-12J transport can ease the burden with a larger mission payload (personnel, cargo, or both), and excellent short-field performance.

A takeoff weight of 16,600 lbs. allows a mission payload of 5300 lbs., plenty for 19 passengers and their luggage. Takeoff distance at max. gross weight is just 3320 ft. (with 50-ft. obstacle clearance). Maximum range: 1460 nm. with reserves.

C-12J Specifications

Maximum ramp weight	*16,710 lbs./(7,579 kg.)*
Maximum zero fuel weight	*14,000 lbs./(6,349 kg.)*
Empty weight	*8,700 lbs./(3,946 kg.)*
Useful load	*8,010 lbs./(3,633 kg.)*
Total luggage capacity	*182 cu. ft./(5.15 m³) 1,910 lbs./(866 kg.)*
Maximum cruise speed	*256 kts.*
Accel—stop distance (at maximum gross weight)	*4,150 ft./(1,265 m.)*



Air Force, Navy, Army, Marines.

The C-12J is a result of the continuing development of the Beechcraft Super King Air turboprop, of which more than 270 are now in service with four branches of the U.S. military. The C-12J offers enhanced versatility with a forward airstair door and an aft cargo door, larger (457cu.ft.) main cabin, and extended c.g. range. A pair of 1100 hp Pratt & Whitney PT6A-65B turboprops deliver a cruise speed of 256 knots.

Special Assignments.

The Beechcraft C-12J is well-suited for a wide range of military special missions. Electronic intelligence, medevac, maritime surveillance, and anti-submarine warfare are among the duties that can be assigned to the C-12J.

BASI Support.

Full logistics support for the C-12J is available from BASI, Beech Aerospace Services, Inc. This worldwide organization now supports more than 270 aircraft, plus target missiles for the U.S. and allied nations.

For more information about the C-12J write: Beech Aircraft Corporation, Aerospace Programs, Wichita, KS 67201.

Beechcraft
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"Without the Osprey, the hostages might still have been with the hijackers."

"First word of the hijacking set a fast chain of events into motion . . .

"Although the airport was many miles away, the Air Force CV-22s slipped up on them quickly, quietly. In fact, we were on top of them before they could react. The Ospreys gave us clandestine precision and surgical accuracy. There was not one casualty among the hostages.

"Maybe, just maybe, this kind of response will send terrorists a message: Using innocent people for your purposes just won't work any more."

It's possible. This Department of the Navy program is producing an aircraft that streaks forward at turboprop speeds, providing unmatched rapid-response capability at very long ranges. Yet, it takes off, hovers and maneuvers like a helicopter.

Credit the Bell Boeing TiltRotor Team for turning a challenging concept into a startling reality. The TiltRotor will bring speed and range you'd need in a fast combat transport. It can reach up high or race across the terrain at treetop level.

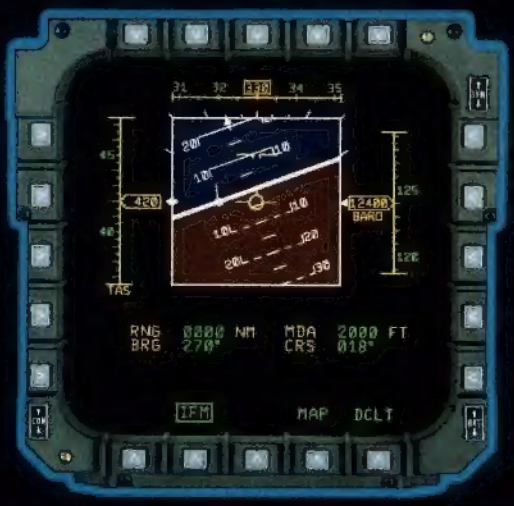
And it will rewrite mission profiles like no other aircraft in the world, ushering in a new era in special operations aviation.

Bell Boeing
THE TILTROTOR TEAM

BENDIX: Designing and Delivering Advanced Color Display Systems

New advanced color display systems developed by the Bendix Flight Systems Division employ design concepts which meet the demands of today's most sophisticated military aircraft. System redundancy was a primary design concept in the development of this advanced color display system. High-reliability is insured through the extensive use of VLSI technology.

Application-oriented design allows for systems flexibility in accordance with your mission and redundancy requirements. Modularity within the Display Processor permits the reconfiguration of the symbol generator to further enhance system redundancy.



Bendix offers the first color display systems to incorporate MIL STD 1750A processors, and to use a new high brightness, high resolution CRT designed to your specifications.

For more details on Bendix developments in advanced color displays, contact:

Bendix Flight Systems Division
Route 46, Teterboro, NJ 07608
Tel. 1-201-393-2142
Telex: 13-4414 (BENDIX TTBR)

Allied Signal

Bendix

See us at Farnborough Booth #NC5, Chalet #28-29

READY. WIL LING. ABLE.

Mission ready has a new meaning at McConnell AFB where an entire wing of KC-135 tankers has been modernized with CFM56 engines.

Today, when the klaxon sounds, reengined KC-135 tankers of the 384th Air Refueling Wing move out with vastly greater fuel offload capabilities. In fact, two KC-135Rs now have the same average offload capability as three aircraft with original engines.

Deliveries of reengined aircraft have started at other US Air Force bases—at the rate of better than three aircraft a month. The production capability is also in place for faster deliveries as funding becomes available.

All reengined aircraft will get the benefits of CFM56 engines that are living up to everything expected of them. And then some. Reduction in fuel consumption, for example, was originally set at 25%. Actual fuel savings has averaged 27%, and comes close to 30% on training missions. During more than 25,000 engine flight hours, reliability has been extraordinary too.

In sum, the KC-135R reengining program adds up to a revitalized tanker force—one that's not only doing its own job better, but enhancing the mission readiness of the entire Air Force. **PROMISES COUNT.**

CASA. Plane Perfection.

CN-235. Designed to deliver.

The CN-235 is designed to deliver with military precision. Built with state-of-the art technology to take on tough military missions. The CN-235 is a pressurized twin turboprop high-wing aircraft. Rugged retractable tricycle landing gear and STOL characteristics make landing on short, unprepared or damaged fields no-problem. Its vast rear cargo ramp door and large interior permits split second loading/unloading of light vehicles and aircraft engines. Operates with door fully open allowing transport of longer trailing loads or low level cargo dropping with absolute accuracy. Easy maintenance guarantees minimum hold-ups, maximum readiness.

The CN-235 will easily carry 8000 lbs. of large dimension items for 1.200 nm. over water (roundtrip Okinawa-Korea). The CN-235 is the aircraft you are looking for. To deliver and perform everytime.

Technical characteristics:

- Max. takeoff weight: 31,746 lbs.
- Max. payload: 11,023 lbs.
- Max. cruise speed: 245 kts.
- Cargo volume: 1,775 cu. ft.
- General cargo transport (88" pallets, LD-3 containers).
- Troop transport (48 soldiers or 41 paratroopers).
- Logistic transport (HMMV's, F-100 & F-404 engines, GPU's, munition loaders, generators, etc.).
- Maritime patrol and antisubmarine warfare versions.
- Electronic warfare version: ESM/ECM.

CASA 1956-1986. 30 YEARS OF DEDICATED SERVICE WITH THE U.S. AIR FORCE.

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COLLINS ARN-139 (V) BEACONING TACAN.

BOOMING SUCCESS.

The pilot anxiously searches the empty sky. Fuel is critically low Where's the tanker?

If it's equipped with Collins AN/ARN 139(V) Beaconing TACAN, it can bring a pilot to the fuel boom faster by letting him read continuous bearing and distance—typically from a 90 n.m. range with demonstrated performance up to 200 n.m.

The ARN-139(V) effectively doubles the range at which the approaching pilot can determine the tanker's position—up to a half hour sooner—compared to normal air-to-air radar.

And with its inverse TACAN capability, the ARN-139(V) allows the tanker to read bearing and distance to an approaching aircraft equipped with any complementary TACAN. The tanker crew can also determine bearing to a DME-only ground station.

The ARN-139(V) flies on Air Force KC-10s, U.S. Marine C-130Ts and a variety of international tankers. It can also be used in tactical, ground and remote field operations

For details contact Collins Government Avionics Division, Rockwell International, Cedar Rapids, Iowa 52498. Phone: (319) 395-2208. Telex 464-421 COLLENGR CDR

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Now delivering... Singer-Rockwell TDMA JTIDS Terminals

JTIDS, the Joint Tactical Information Distribution System, is now a reality with integration in process on U.S. Air Force F-15 aircraft and the U.S. Army PLRS-JTIDS Hybrid.

Rockwell International's Collins Government Avionics Division and Singer's Kearfott Division are delivering AN/URC-107(V) Class 2 terminals which will make it possible for Air Force and Army elements to coordinate missions with reliable, real-time information.

AWACS and fighter-attack aircraft can share common information with Army ground air defense, artillery and surface-to-air missile commands over the JTIDS network. The services will also share data on enemy positions, speed and strength and important information about friendly forces, such as identity and positions, weapons status and fuel reserves.

Here's how we've geared-up for full scale production.

- Through participation in the U.S. Air Force Tech Mod program, our facilities modernization plan promises high-quality, low-cost production.
- We're applying 40 years of Collins RF expertise—including production of 20,000 ARN-118 TACANs and more than 14,000 ARC-186 VHF transceivers.
- We've developed advanced handling, assembly and test methods for RF circuitry, leadless chips and surface mounted devices for efficient production of JTIDS Class 2 terminals.

Rockwell and Singer are committed to providing the lightning-fast information our services need. To find out more about the JTIDS program and Rockwell's role in it, contact: Collins Government Avionics Division, Rockwell International, Cedar Rapids, Iowa 52498. Or call (319) 395-2208.

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WHEN 'CLOSE ENOUGH' ISN'T CLOSE ENOUGH.

COLLINS GPS.

The Collins Global Positioning System (GPS) receivers can improve the performance of cruise missiles by helping them find elusive enemy targets. GPS can also give mission planners greater flexibility by allowing missiles to be retargeted in-flight.

Our Navstar GPS can deliver accurate navigation updates for mid-course guidance to over-the-horizon targets. GPS enables missiles to fly around obstacles and reduces the jamming time available to the enemy.

Test flights have proven the effectiveness of Collins GPS combined with an infrared seeker. And we've demonstrated the anti-jam capability of a GPS-INS integrated system.

The DoD has selected Collins military GPS. We've built an entirely new, computer-integrated manufacturing facility capable of providing Collins GPS in quantities to meet high volume requirements. And our state-of-the-art GPS hardware, proven mature software and in-place support ensure confidence in system performance.

For details contact: Collins Government Avionics Division, Rockwell International, 400 Collins Road NE, Cedar Rapids, Iowa 52498. (319) 395-2208. Telex 464-421.

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DATA GENERAL ASKS: ARE YOU PLAYING RUSSIAN ROULETTE WITH YESTERDAY'S TECHNOLOGY?

FOR ADVANCED COMPUTER SYSTEMS, TALK TO US. IT'S WHY SO MANY GOVERNMENT DEPARTMENTS HAVE CHOSEN DATA GENERAL.

Government business is too critical to be taken for granted. Too much depends on it.

No wonder nineteen of the top twenty U.S. defense contractors have bought a Data General system. As have all the Armed Services and most major departments of the federal government.

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TODAY'S BEST VALUE

Why such unanimity? Because Data General offers a complete range of computer solutions for government programs, with one of the best price/performance ratios in the industry.

From our powerful superminis to the DATA GENERAL/One™ portable. From unsurpassed software to our CEO® office automation system. Plus complete systems for Ada® and Multi Level Secure Operating Systems, and a strong commitment to TEMPEST.

All Data General systems have full upward compatibility. And because they adhere to international standards, our systems protect your existing equipment investment. We give you the most cost-effective compatibility with IBM outside of IBM—and the easiest to set up and use.

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We back our systems with complete service and support. As well as an investment in research and development well above the industry norm.

So instead of chancing yesterday's technology, take a closer look at the computer company that keeps you a generation ahead. Write Data General, Federal Systems Division, C-228, 4400 Computer Drive, Westboro, MA 01580. Or call 1-800-DATAGEN.

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a Generation ahead.

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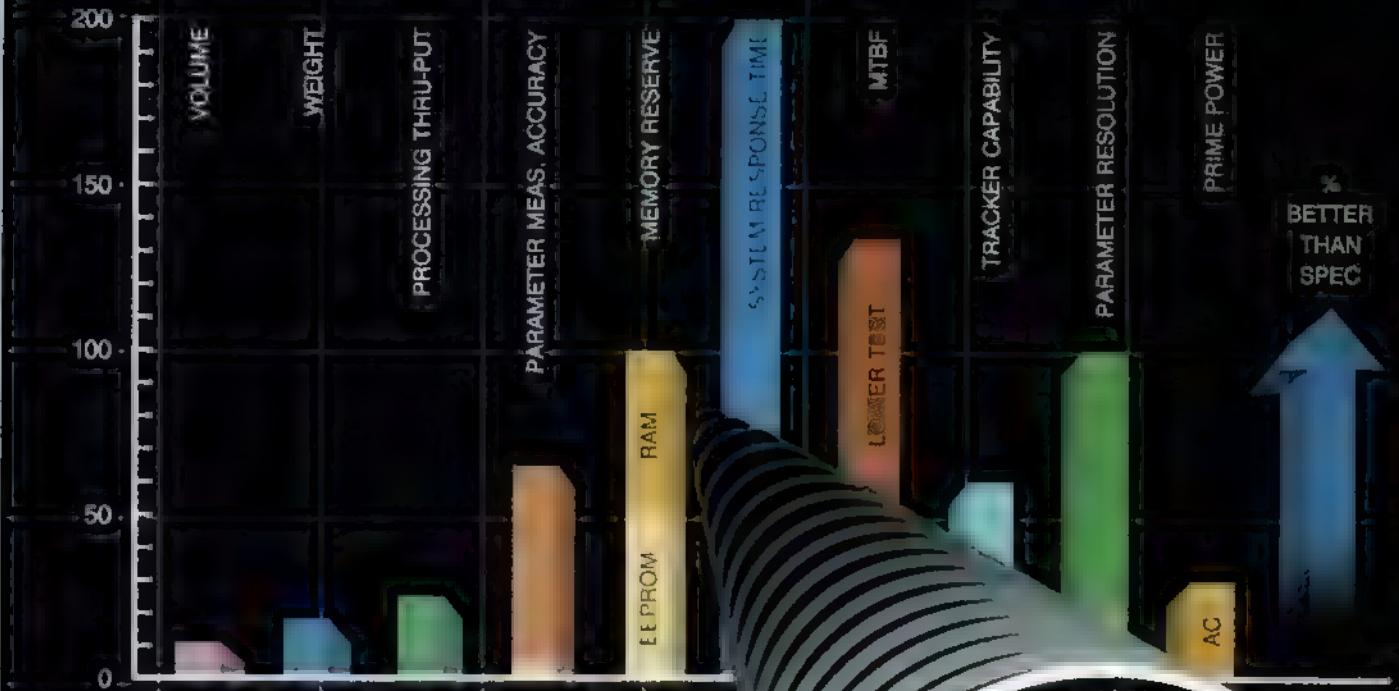

The Eaton Team... Right on Target

For the EF-F-FB-111 Self Protection ECM Update Program, Eaton, together with Boeing, Northrop, Delco and Tasker, offers a flight proven jamming technology. Now.

Eaton, with an established capability on the B-1B, the EF-111A and the P-3C programs can provide specially tailored, better-than-specifications results for the Update Program. On time and without additional expense.

Eaton's systems oriented management recognizes the critical importance of remaining at the cutting edge of this rapidly changing and demanding technology.

Eaton ... the Originator is still the Innovator.

For further information contact:
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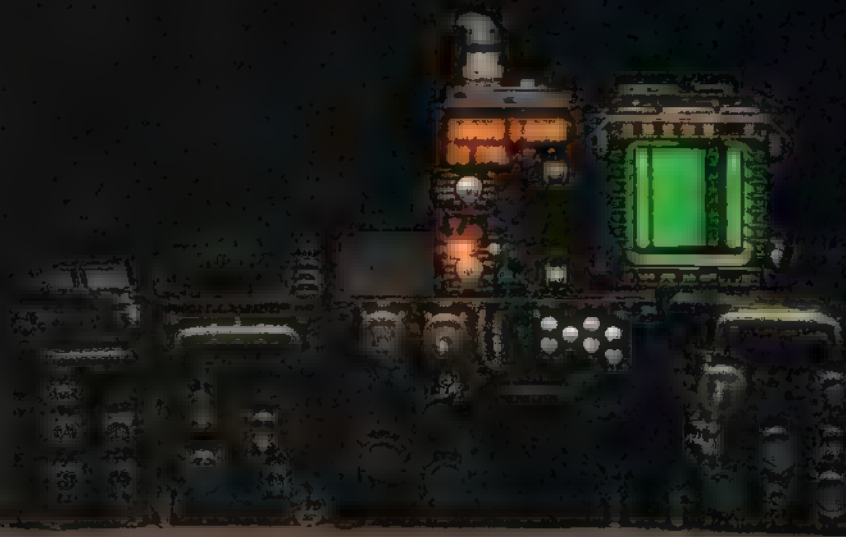
Elbit's Weapon Delivery and Navigation Systems are ready for action. Developed in interaction with and flown by the Israel Air Force. Elbit's WDNS, the choice for retrofit programs.

System 81. An IMU-based, digital computerized system featuring smart weapons handling, head-up displays (HUD), accurate navigation and advanced A/G and A/A modes.

System 82. Offering the same state-of-the-art features. Enhanced with a Stores Management System.

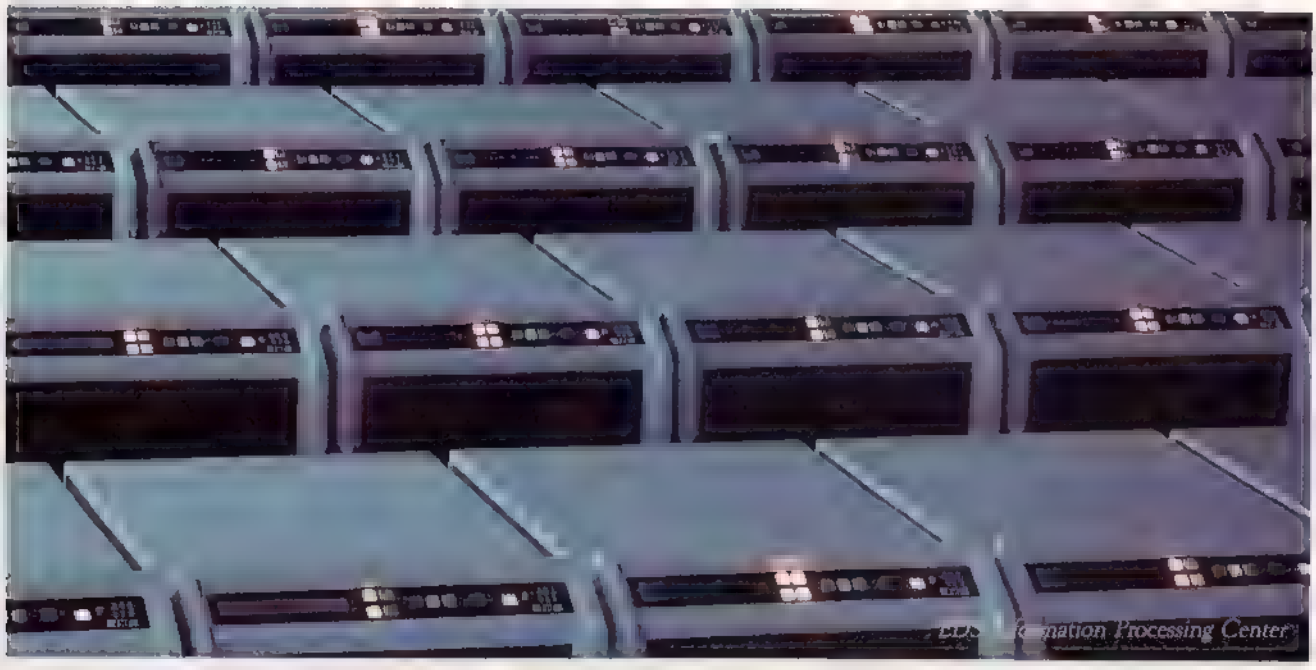
Low cost WDNS. Ennanced A/G and full A/A modes. Digital computation combines with head-up display (HUD), increasing aircraft operational capability. A moderately priced system developed as the intermediate stage between expensive, full performance WDNS and very low cost, low performance gunsights. Particularly compatible with light attack aircraft, advanced trainers and interceptors.

Ally your forces with experience. With systems bred in battle. Forged in action. Elbit Weapon Delivery and Nagivation Systems, on the front line.



BATTLE BRED

THE WELL-RUN COMMAND.



When you lead thousands, you can't let one thing stop you from getting your job done.

That's the EDS philosophy. It's the way we work, and it's what makes us different.

We don't try to shoehorn our customers into stale old data processing systems. We create smart, flexible solutions to fit the needs of our customers.

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At EDS, that's the way we've been running our business for nearly 25 years. It's helped make us an international corporation—the largest U.S. supplier of computer services to the insurance and financial industries. And we serve a fast-growing list of federal, state and local agencies—including the Department of Defense.

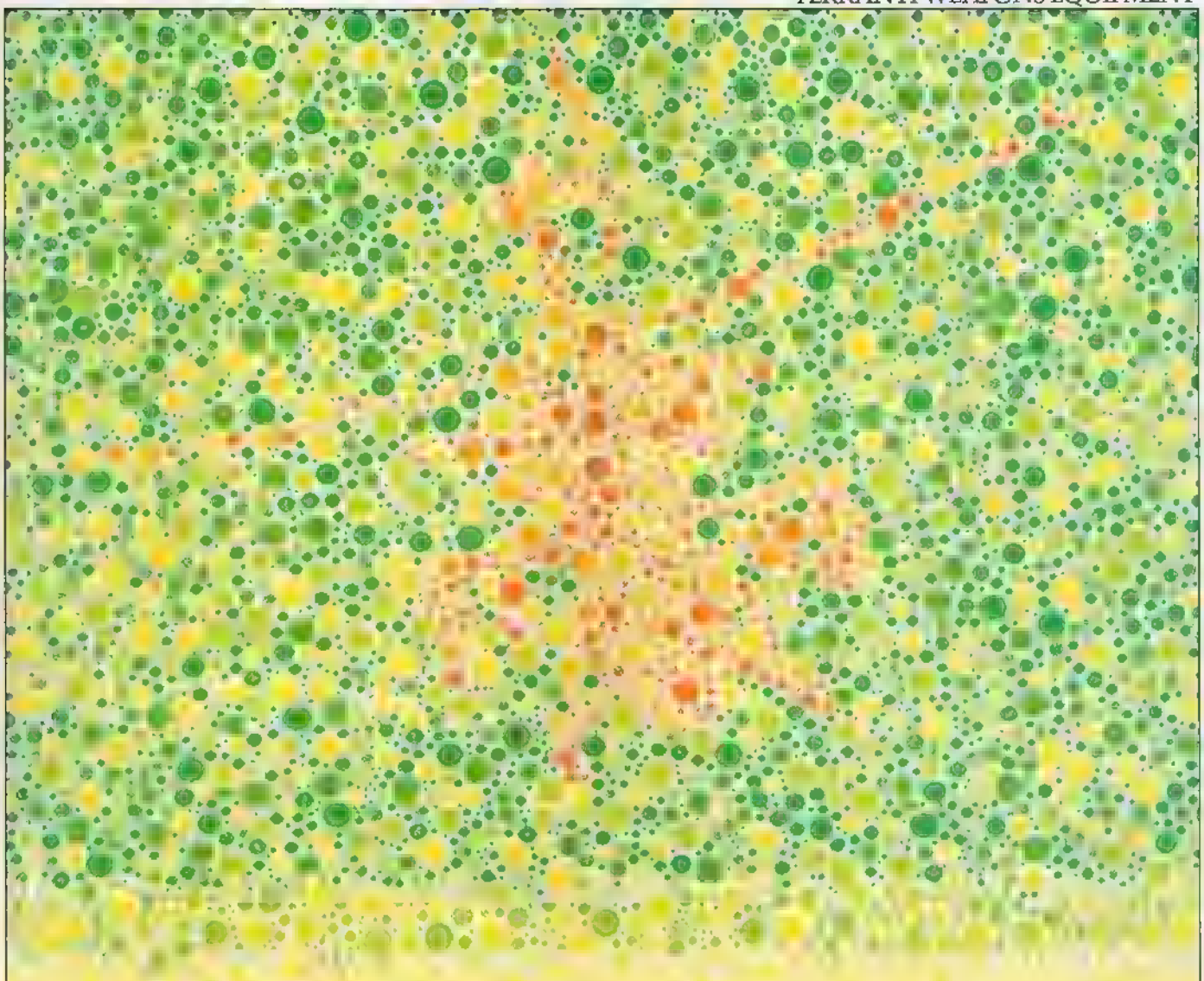
We've made our customers more productive. And they've responded by renewing or extending the majority of our contracts.

It's more work to run a can-do data processing corporation, but to us it's worth it.

We do our job right, so you can do what you do best. And that's to command.

EDS

Electronic Data Systems Corporation



You can't always believe your eyes.

The helicopter threat cannot always be seen.

That's why you need PICKET.

PICKET will detect and identify helicopters – whether you can see them or not.

Don't let helicopters exploit your blind spots.

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clear images aviators live by.

- Electro-Optical Imaging Systems
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Ford

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& Communications Corporation

IT TAKES MAGIC TO MEET THE HIGHEST STANDARDS IN THE WORLD.

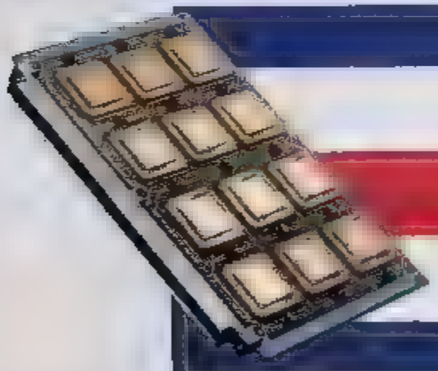
Magic V, the 1750A "computer on a card" is ready for program commitment, NOW! And Delco's got it. Our VLSI MIL-STD-1750A Magic V Computer can be a single embedded processor or a high-throughput multiprocessor. Whatever your requirements, Magic V will do the job.

Magic V accommodates a range of full scale engineering programs. Its high performance, multipurpose design includes self-diagnosis, self-test and self repair functions. Because Magic V is a building-block concept its versatility is virtually limitless.

Planning on VHSIC? VLSI Magic V is the low-risk path to VHSIC insertion with size, weight and power benefits of VHSIC.

VLSI MIL-STD-1750A. Delco's got it.

For more information, write Jaees Manager, Delco Systems Operations, General Motors Corporation, 6767 Hollister Ave., Goleta, CA 93117. TWX 910-334-1174. Or call the Delco Action Line, (805) 961-5903.



Magic V MIL-STD-1750A, Notice 1 Computer at a Glance

- For high-reliability aircraft, spacecraft, missile avionics, high speed ECM and ground applications
- All-VLSI CMOS technology
- Full MIL-STD-1750A, Notice 1, addressing to 4 million words
- Built-in multiprocessor capability
- 1 to 5 MIPS throughput (DAIS MIX)
- Module level fault isolation
- Built-in IEEE 488 maintenance bus.
- Low power (example: single ½ ATR card contains CPU and 192k words of RAM at less than 5 watts).
- Complete software development system

Delco Systems Operations

DELCO'S GOT IT.

THE F-16 FIGHTING FALCON. UNSURPASSED PERFORMANCE . . . AGAIN!

The six teams flying F-16s dominated Gunsmoke '85 . . . sweeping top team and individual honors. Participating in this worldwide U.S. Air Force fighter-attack competition were 17 teams flying four different types of aircraft. Congratulations to all the F-16 pilots and ground crews on their outstanding performance.

GUNSMOKE '85

RESULTS	AIRCRAFT	UNIT/BASE
1st Place	F-16	419 TFW/Hill AFB
2nd Place	F-16	50 TFW/Hahn AB
3rd Place	A-10	23 TFW/England AFB
4th Place	F-16	8 TFW/Kunsan AB
5th Place	F-16	169 TFG/McEntire ANGB
6th Place	F-16	363 TFW/Shaw AFB
7th Place	F-16	474 TFW/Nellis AFB

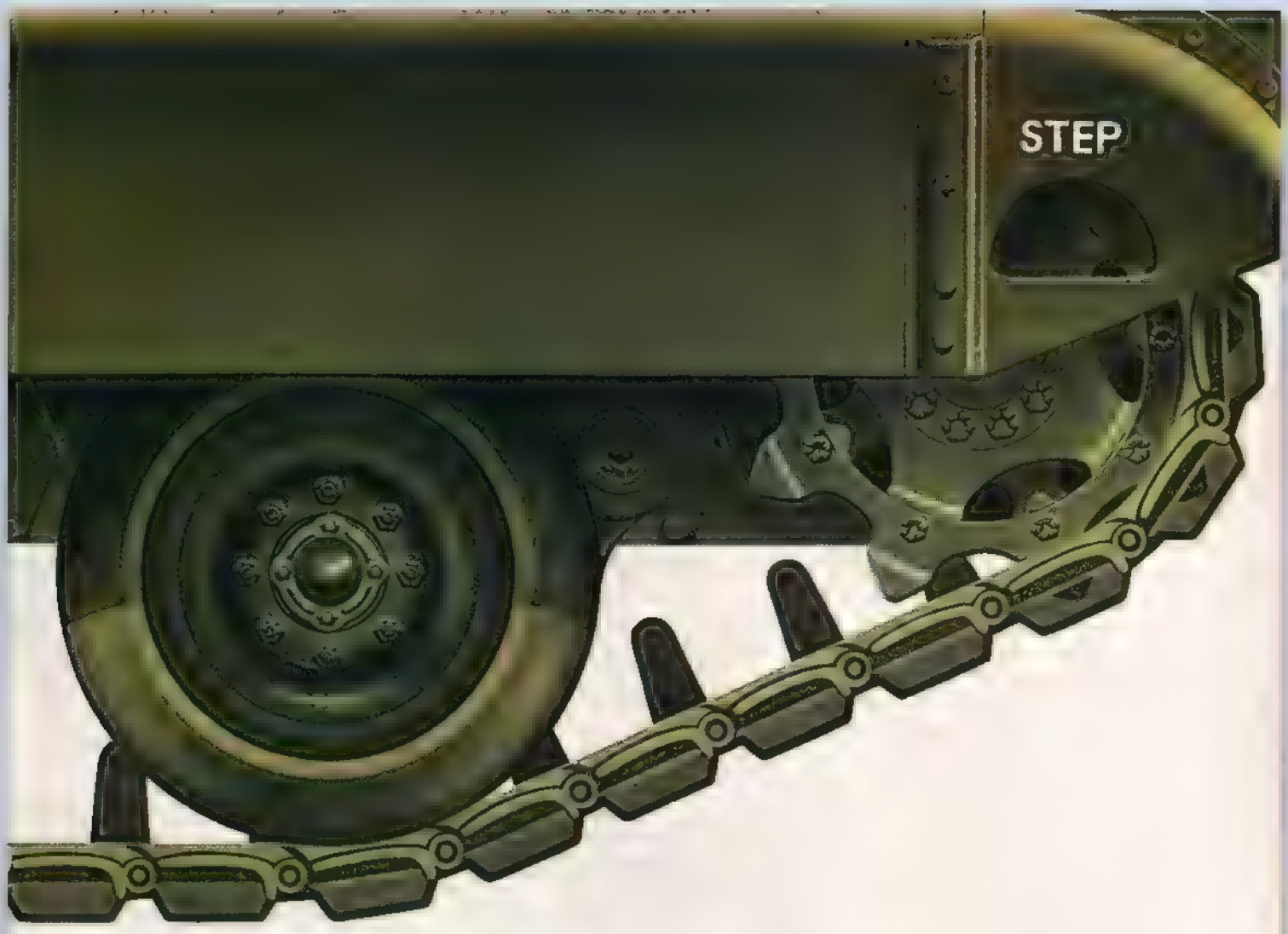
Atlas Launches Satellite from Vandenberg AFB, Calif.

Atlas Centaur Launches Communications Satellite from Cape Canaveral Fla.

PROVEN PERFORMANCE IN SPACE LAUNCH VEHICLES.

Atlas and Centaur launch vehicles continue to extend their superb record of performance that includes 485 Atlas launches and 72 Centaur launches. Produced by the General Dynamics Space Systems Division, these flight-proven launch vehicles stand ready to meet present and future military and commercial requirements.
Atlas and Centaur: Capable. Reliable. Available.

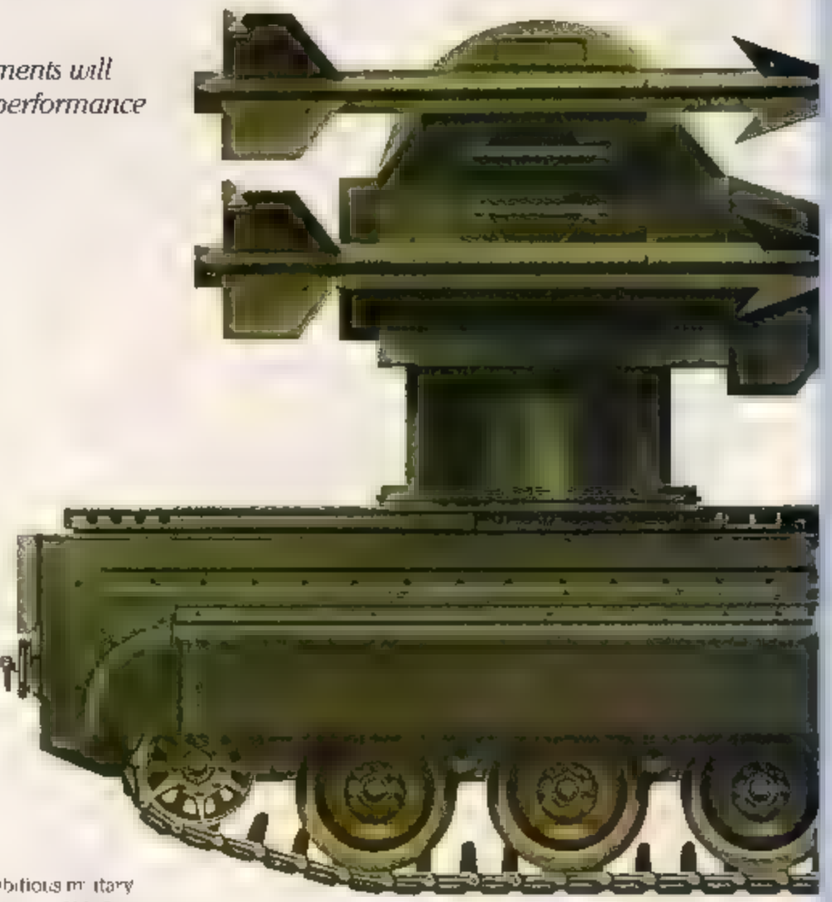
GENERAL DYNAMICS



Back on track.

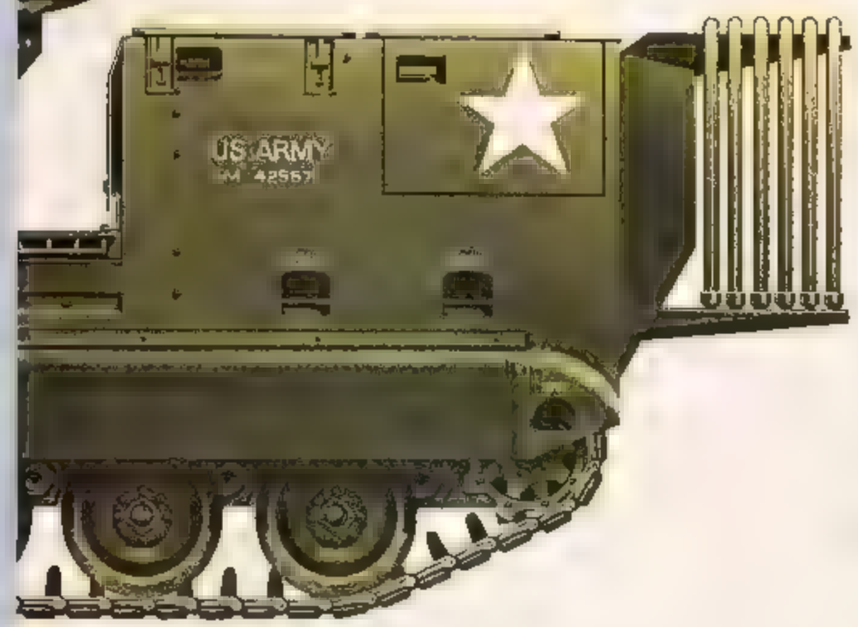
A new General Motors power pack lets a veteran performer shoulder a greater air-defense burden.

Detroit Diesel Allison improvements will increase the payload and the performance of future M113 variants.



The M730 short range air-defense missile carrier has been improved since it was first fielded by the U.S. Army in 1969. The capability of the M730's Chaparral missile system has increased, and so has its weight—1200 pounds worth of better accuracy and electromagnetic pulse protection in the latest upgrade alone. A new General Motors power pack means the M730A2 will serve through the 1990s with greater reliability, higher efficiency, and lower support costs for the engine and transmission—without compromising vehicle performance.

Tomorrow's technology is the target, and Detroit Diesel Allison is hitting it with research and development. Higher power density and mobility are important to armored vehicles. The Advanced Integrated Propulsion System (AIPS) will be the state of the art. GM is developing the transmission component for AIPS: multiple speeds, full authority electronic controls with diagnostic and prognostic capability, power hybrid brakes, hydrostatically controlled differential steering; throughput efficiencies in excess of 90%. Our combined experience has already enhanced our contribution.



Mastery of electronics and new materials will maximize engine efficiency. GM is already producing engines with Detroit Diesel Electronic Controls. Simple chip changes will permit changing performance parameters. New sensors and controls will lead to prognostics and improved diagnostics. We've demonstrated a model of a Low Heat Rejection engine using ceramic components. We're at work on methanol-fuel technology, on turbocompounding, on hydraulic-assist turbocharging. We have marshaled $200 million behind plant technology to build the first diesel engine designed from the ground up with electronic controls.

Matching engines and transmissions to ambitious military requirements is standard operating procedure at GM's Detroit Diesel Allison Division. We have been doing it for decades. For every branch of the service. For vehicles on tracks, on wheels, or on the water. For the U.S. and for its allies.

For the Marine Corps, GM builds the Light Armored vehicle in all its variants, around a DDA power pack. Every new truck in the U.S. Army's fleet is driven by a GM engine or transmission—or both. Detroit Diesel engines or Allison transmissions go into combat track-laying vehicles ranging from the M113 to the Army's flagship Abrams Main Battle Tank.

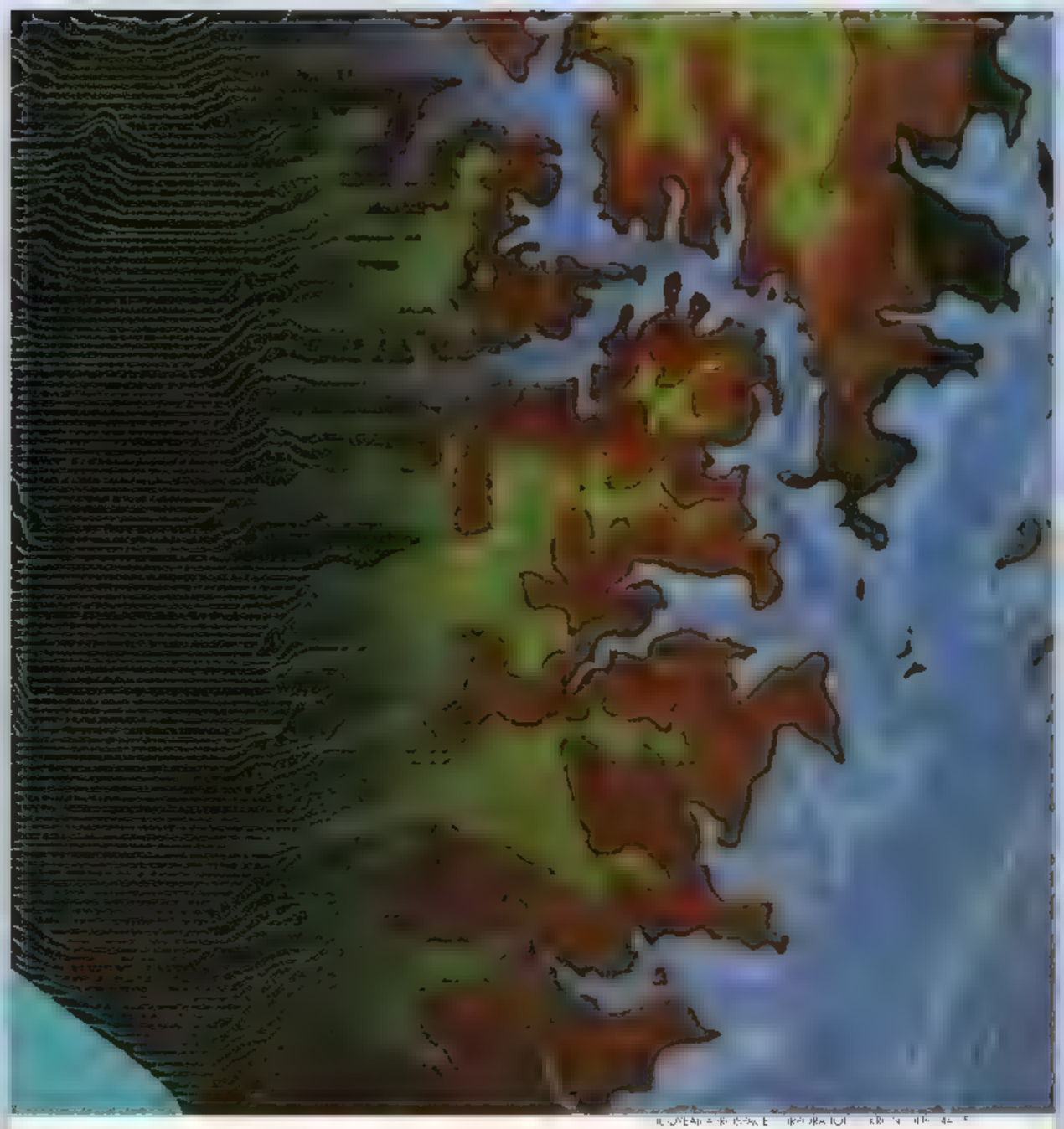
The Navy's Sea Fox fast patrol boats and Small Waterplane Area Twin Hull (SWATH) craft rely on Detroit Diesel engines.

One reason for our success is our wide experience with chassis and powerplant manufacturers outside GM—we worked with FMC, for example, on the M113. A measure of that success is our acceptance on vehicles manufactured outside the U.S. Detroit Diesel Allison has established an international reputation. We have proved our ability to provide our products with Integrated Logistics Support worldwide.

Detroit Diesel Allison Division. It's just one of the many resources at GM that are committed to providing the latest in tactical and strategic technology—on time and on cost. General Motors Defense. We're your ultimate ally in the fight for dependable, affordable defense. To enlist our aid, write to our Washington, D.C. office: General Motors, 1911 North Fort Myer Drive, Suite 800, Rosslyn, Virginia 22209.

THE ULTIMATE ALLY

GENERAL MOTORS DEFENSE



Computer technology for earth mapping. Reconnaissance pictures in computer language must be translated into an earth image. NASA required a method of converting recorded digital image data of soil conditions to film imagery. So Goodyear Aerospace developed a system which scans and records energy reflected from the earth's surface. It brought together the sophisticated resources of Goodyear Aerospace technology. We break down complex problems and solve them simply. Goodyear people have the expertise, experience and facilities–plus the long term commitment to get you where you want to go.

GOODYEAR AEROSPACE

THE X-29: THE RIGHT TECHNOLOGIES, RIGHT NOW.

The Grumman X-29 is a multi-technology demonstrator. And with each flight it extends the frontiers of aeronautics for the next generation of tactical aircraft.

Its multi-technologies include: Aerolastically Tailored Composite Forward Swept Wing–the X-29 is the world's first supersonic aircraft to employ this wing design.

Thin Supercritical Wing–the X-29 is the first aircraft to test a wing with one-third the thickness of previous supercritical wings.

Relaxed Static Stability–this feature is designed to achieve less drag, more maneuverability, increased fuel efficiency.

Variable Incidence Close-Coupled Canard–this provides primary pitch control, augments lift, and reduces supersonic drag.

Advanced Flight Controls stability is achieved by a digital fly-by-wire control system that continuously adjusts flight conditions by transmitting up to 40 commands a second.

Discrete Variable Camber –this allows the curvature of the wing to be changed in flight for the best combination of lift and drag for cruise, maneuvering, takeoff, and landing.

Three Control Surface Configuration–the canards, flaperons and strake flaps work together to provide more maneuverability.

All of these technologies are integrated in the X-29. And right now the Grumman X-29 is testing the technologies that are critical to tomorrow's advanced aircraft. Grumman Corporation Bethpage, LI, NY 11714.

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LEADING BY EXAMPLE.

In the race to develop the Advanced Tactical Fighter, Grumman is already flying.

Our X-29 is presently demonstrating eight technologies integrated to reduce ATF risk.

The X-29 is more than mere theory. It's an operable approach to developing a fighter that's reliable. Maintainable. Producible. Supportable. And affordable.

Grumman Aircraft Systems,
Bethpage, Long Island, NY 11714.

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WHEN WHAT GOES UP MUST NEVER COME DOWN

Fault tolerance is playing an increasingly critical role in defense applications. In our Fault Tolerant Laboratory, Grumman Data Systems scientists and engineers are developing tomorrow's technologies to meet the needs of defense.

In C³I, for example, we are establishing a prototype system to evaluate the concept of fault tolerant computing that emphasizes system integrity and software adaptability. A key objective is establishing a real-time distributed Ada environment for C³I systems.

Besides our work with fault tolerant systems, Grumman Data Systems is one of the leaders in research and development in advanced networking, computer graphics, artificial intelligence and the Ada software language.

To discuss your fault tolerant requirements, contact Wesley R. Stout, Director, Technical Services at (516) 682-8500.

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GRUMMAN

Gulfstream Aerospace
A CHRYSLER COMPANY

AEROSTRENGTH

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HERCULES

SCIENCE/SCOPE®

Programmable software formats within a night vision system for helicopters allow new features to be added as needed to meet new threats. The Hughes Night Vision System (HNVS), developed by Hughes Aircraft Company, is a low cost, forward-looking infrared system that provides excellent imagery and object detection day or night in all weather. It has extensive built-in test and fault isolation test capabilities. Among the features that may be modified to meet specific requirements are flight symbology, navigational data, automatic set-up mode, system status data, and push-buttons around the display face.

The Australian Army will use a radar simulator to train operators and maintenance personnel on the AN/TPQ-36 Firefinder weapon locating radar. The trainer, designed by Hughes and built by British Aerospace Australia, is a computerized system that trains personnel without using either the production radar or live artillery fire. The radar itself pinpoints the position of enemy mortar, artillery, and rocket launchers. It rapidly scans the horizon with a pencil-thin beam, forming an electronic curtain across the battlefield. After detecting incoming projectiles, the system backplots their trajectories and passes the data to friendly forces for counterfire.

Pilots of AV-8B Harrier II aircraft can score direct hits on targets on their first pass, thanks to a computerized weapon delivery system. The Angle Rate Bombing Set (ARBS), mounted in the nose of the U.S. Marine Corps aircraft, lets the pilot deliver guided and unguided weapons and direct gunfire with unprecedented accuracy. ARBS cuts the time an aircraft is exposed to enemy fire by helping the pilot hit a target on his first run and avoiding the need for other passes. The AV-8B, produced jointly by British Aerospace and McDonnell Douglas, is capable of short takeoffs and vertical takeoffs and landings. The Hughes ARBS also is installed on the Marine Corps' A-4M and the United Kingdom Royal Air Force GR Mk5 Harrier.

West German F-4F Improved Combat Efficiency Phantoms equipped with AN/APG-65 radars will enable the aircraft to remain effective through the end of the century. The APG-65 is the radar carried on all F/A-18 Hornet Strike Fighters. It is an all-digital multimode system designed for both air-to-air and air-to-surface missions. In air-to-air operations, the APG-65 will give the Phantom a clean radar scope in either look-up or look-down attitudes. It will also provide track-while-scan capability, long-range search and track, automatic acquisition of multiple targets, and several modes for close-in combat. Moreover, the all-weather sensor will give the F-4F ICE aircraft full capability for launching AIM-120 AMRAAM missiles. Hughes, which developed and builds the radar, is under contract from Messerschmitt-Boelkow-Blohm for the definition phase of the F-4F ICE program. Hughes will also work with AEG-Telefunken on the program.

A U.S. spacecraft orbiting Venus made the first close-up views of Halley's Comet, giving scientists valuable insights into the comet at a time when it was on the far side of the sun and direct observations from Earth were impossible. NASA's Pioneer Venus Orbiter, built by Hughes and circling Venus since 1978, conducted its investigation a month before five other spacecraft flew by the comet. The Orbiter was delicately repositioned with precise commands from Earth to observe Halley's at its closest point to the sun, a distance of about 55 million miles. The spacecraft measured changes in the comet caused by intense solar heating. It also provided an ultraviolet image of Halley's and its large surrounding hydrogen cloud. Data gathered by the Orbiter helped scientists determine the gas composition of the comet, the rate at which water vaporized, and the ratio of gas to dust in the comet.

For more information write to: P.O. Box 45068, Los Angeles, CA 90045-0068

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Subsidiary of GM Hughes Electronics

SCIENCE/SCOPE®

You are reading perhaps the most successful corporate advertising campaign ever, Science Scope, which marked its 20th anniversary in September 1986. The campaign -distinguished by its editorial style of writing, newsletter format, and yellow background color was created in September 1966 to inform readers of advances in technologies and programs at Hughes Aircraft Company. It has won scores of awards for creative excellence and for leading readership surveys in a variety of publications. The first ad reported on such technological advances as a technique for keeping a satellite stable in orbit, an infrared guided missile, and a spacecraft instrument that could categorize the surfaces of planets. Today Science Scope appears in approximately 80 publications worldwide and 10 languages We thank our readers for their continued support.

Any military aviator helicopter helmet can be equipped with a night-vision system designed for use by pilots of helicopters. The Aviator's Night Vision Imaging System (ANVIS) is a helmet mounted binocular that intensifies nighttime scenes illuminated by faint moonlight or starlight. It uses advanced optics and mechanical components to offer high performance in a rugged, lightweight package. Helmets equipped for ANVIS include the U.S. Army SPH 4, the U.S. Navy SPH 3, and helmets for UK Army and French Army helicopters. ANVIS is also compatible with the TOW Cobra day sight. Hughes Optical Products, a Hughes subsidiary, builds ANVIS for the U.S. Army.

Confusing enemy weapons so they plunge harmlessly into the ocean is the job of an electronic warfare system now being installed on U.S. Navy aircraft carriers. The SLQ-17A shipset can deceive an enemy missile's guidance system by transmitting a ghost image of a Navy carrier The hostile weapon locks onto this false image and veers away from the real ship. Hughes delivered the most recent system for installation aboard the USS Independence (CV-62) and is continuing to provide this essential warfare system to Navy aircraft carriers.

TOW missiles are being modified to have an even greater armor piercing capability. The Improved TOW, or ITOW, carries a five inch diameter warhead incorporating advanced technology. The improved wire-guided missile has approximately the same weight and size as the basic TOW, but includes a probe on the nose of the missile for standoff detonation. The ITOW warhead can be retrofitted on all basic missiles and requires no changes in the launcher or guidance hardware. Hughes builds missiles in the TOW family for the U.S. Army and Marine Corps and over 30 nations.

The U.S. Navy may save more than $103 million on shipboard display systems due to engineering, manufacturing, and testing improvements developed and funded by Hughes. The saving will result from lower purchase prices and decreased operations and maintenance costs during the anticipated 30-year service time of the displays The AN/UYQ-21 display is the standard for weapons control. An operator receives surveillance data from sensors such as radars and sonars After evaluating threats, he assigns targets to the appropriate defensive systems, including missiles, guns, and electronic countermeasures. The displays will be installed in AEGIS-class cruisers, DDG-51-class destroyers, amphibious assault carriers, and ships now in service.

For more information write to P.O. Box 45068, Los Angeles, CA 90045-0068

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SCIENCE/SCOPE®

A high-frequency tactical radio for military vehicles and base stations is proving extremely reliable in the field. Operating on average more than 3,000 hours between failures, the AN/GRC-213 high-frequency radio makes extensive use of large-scale integrated circuits, conservatively rated components, and proven military equipment packaging techniques. Should it need repairing or maintenance in the field, an operator can replace any of the three basic subsystems in seconds. The average repair time in the field is less than 30 minutes. In production at Hughes Aircraft Company for the U.S. Army, Navy, Marine Corps, and Air Force, the AN/GRC-213 is available for international needs.

An innovative digital receiver is being developed to alert military aircraft when they are approaching enemy radars and electronic warfare systems, thereby putting them at less risk while on a mission. The device, designed for electronic support measures (ESM), will be approximately 1/20 the weight and substantially smaller than current receivers. It will search for, intercept, record, analyze, and locate sources of radiated electromagnetic energy. The receiver can store this information. Or, if an enemy signal poses a threat, it can pass this information along to another type of electronic warfare system, such as a jamming device. Hughes is developing the receiver with independent research and development funds.

The U.S. Marine Corps has a new one-two punch for close air support with a computerized weapon delivery system and the laser-guided Maverick missile. The Angle Rate Bombing Set (ARBS), mounted in the nose of the AV-8B and A-4M aircraft, lets a pilot deliver guided and unguided weapons and direct gunfire with unprecedented accuracy. ARBS cuts the time an aircraft is exposed to enemy fire by helping the pilot hit a target on his first run and avoiding the need for other passes. Laser Maverick locks on to the reflection of a coded laser beam aimed at a target by ground troops or an aircraft crew. The air-to-surface missile can also be carried by F/A-18 Hornet Strike Fighters and A-6E aircraft. Both ARBS and Laser Maverick are in production at Hughes.

A cryogenic refrigerator designed to cool infrared sensors has passed a test equivalent to operating three years in space. The Vuilleumier cycle cooler, set in operation at twice its normal speed in order to simulate a design life of five years, has passed the year-and-a-half point of flawless operation. The device will be used with infrared sensors in space for applications such as defense and geological surveys. The sensors must be chilled to near absolute zero to maintain adequate sensitivity to low-temperature thermal radiation. The VM cooler, developed by Hughes, is believed to be the only one of its type to have performed this long at such low temperatures.

Twenty years ago on June 1, Surveyor 1 made the first soft landing on the moon, giving scientists their first close-up look of the lunar surface and blazing a trail for the manned Apollo missions three years later. The three-legged spacecraft, built by Hughes, landed one second ahead of the originally predicted time and just nine miles from the predicted target point after traveling 240,000 miles. In the following eight months, Surveyor televised 11,150 pictures, photographed the solar corona of the setting sun, made a color composite photo of the lunar surface, and measured the hardness of the lunar surface. By January 1968, four other Surveyors had made soft landings on the moon. They provided detailed scientific information about the physical and chemical character of lunar materials and added immeasurably to the understanding of the physical processes that shape the moon's surface.

For more information write to: P.O. Box 45068, Los Angeles, CA 90045-0068

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We're Information Systems & Networks Corporation (ISN) a successful organization recognized for our ability to provide clients with innovative, cost-effective solutions for the gamut of high-tech problems. To maintain an impressive track record, we prefer only results-oriented professionals who possess both vision as well as practical abilities.

Ours is a progressive environment, where creative people have either ample opportunities to work independently, or on teams comprised of professionals of equal calibre. All of our high-tech professionals have in-depth experience in either telecommunications or the computer industries.

ISN offers EXCELLENCE IN TECHNICAL SERVICES to a rapidly changing technological world, and is proud of its technical services team. If you seek more information about the ISN team, please call or write: **INFORMATION SYSTEMS & NETWORKS CORPORATION, 5454 Wisconsin Avenue, Suite 1450, Chevy Chase, MD 20815. (301) 654-8180.**

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ITT Avionics' ECM Systems provide effective, reliable protection for an impressive range of military aircraft.

Wherever the American military fly, a wide range of their aircraft depend on ITT's electronic countermeasure systems for enhanced mission effectiveness and survivability.

They do it with a family of electronic countermeasure systems developed by ITT Avionics to protect all types of aircraft from hostile weapon systems.

For instance, the ALQ-172/Pave Mint system is increasing the survivability of the B-52 fleet.

The ALQ-136 lightweight jammer is providing protection for Army attack helicopters.

And the ALQ-165/Airborne Self Protection Jammer (ASPJ) will provide the highest performance electronic countermeasures for a variety of high performance tactical aircraft.

Electronic countermeasures protection from ITT Avionics—where technical excellence, sophisticated production technology and a commitment to superior product support combine to provide outstanding protection for the world's finest military force.

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SECURITY LOUD & CLEAR.

For secure voice/data communications...on land, sea and air. The ITT ANDVT Advanced Narrowband Digital Voice Terminal is in production.

The success and survivability of tactical forces depends upon the security of their communications And when it comes to secure voice/data communications, ITT's ANDVT Advanced Narrowband Digital Voice Terminal speaks your language

Whether the environment is shipboard, airborne, ground mobile or ground fixed, the ANDVT (CV-3591) provides secure half duplex voice and data communications. The terminal utilizes two similar processors for both voice and data processing

Key voice processing functions are LPC-10 and ambient noise reduction. There are two independent modems, one for LOS and the other for HF radio transmissions Both with error protection coding and correction. The ANDVT terminal can be used as a Voice Processor only or a HF/LOS Modem-Only when operating with the optional plug-in module

The ANDVT is easy to operate and requires no preventative maintenance or adjustment. And it has built-in on and off-line testing It gives you clear, clean transmissions reliability and above all—security

The ANDVT Advanced Narrowband Digital Voice Terminal from ITT For more information contact ITT Defense Communications Division, 492 River Road, Nutley, NJ 07110 201-284-2205

ITT

DEFENSE COMMUNICATIONS

IAI and Your Military Infrastructure

From an original oil painting for Israel Aircraft Industries by Barry Bichler

15:45 Production Control Work Status Report

Marketing Mgr to Div Mgr — Customer confirms approval of our proposal to upgrade all of his F-4 aircraft. Depot maintenance and avionics retrofit in process on 4 A-4 aircraft

Flight Test to Div Mgr — Last of 12 Mirage completed flight test at 10:00.

A/C Overhaul to Div Mgr — In process C-130 D-check proceeding O.T. 707 special mission conversion to be in hangar at 24:00.

Engine Plant to Div Mgr — 3 J-79's and 4 J-52's in process. 5 T-56's in inspection. 3 J-52's, 2 F-100's, 1 Atar, 2 PT6's and 5 Allison 250's in test cells. F-110 crew chief training accomplished.

Accessories Plant to Div Mgr — 5 F-100 fuel control systems, 28 digital avionics packages and 17 hydraulic systems in process.

IAI *Featuring the Future*
ISRAEL AIRCRAFT INDUSTRIES LTD

To keep your aircraft combat ready, you need
- to be able to rectify problems quickly
- service that is readily available 24 hours a day
- personnel trained to handle *your* aircraft's systems
- total management control systems that keep you in the picture at all times
- all of this wherever you need it and for just as long, at a cost you can afford.

The Bedek Aviation Division of IAI can supply what you need. We've been supplying it to the Israel Defense Forces and other modern and modernizing air forces for many years.

- The capability to service, repair and upgrade virtually any aircraft from a light trainer to an advanced combat aircraft
- Airframe modification to convert old transports to multi-mission platforms
- An engine plant with computerized test cells, in-house developed repair schemes and inspection criteria to increase fuel efficiency and save you money
- An accessories repair and overhaul facility treating more than 40,000 types of hydraulic engine and avionic systems, helicopter blades, and dynamic components
- Authorized by the world's leading air forces.

For data, aircraft support and support training, IAI's Bedek Aviation Division. For helicopters, IAI's Mata plant. IAI provides a single source for air, sea and ground technology.

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AIRMAIL

The Proud Guard

I, along with many other members of Air National Guard units, would very much like to see AIR FORCE Magazine publish more articles about the Air Guard.

After having served four years of active duty with USAF including a tour in SEA, I remained uninvolved for ten years prior to enlisting in the Guard. Since enlisting in the Guard, I have discovered a totally different Guard from the one we on active duty had so casually laughed about and referred to as "weekend warriors."

I see a very qualified, very professional and totally dedicated group of individuals with years of military experience that is closely united to serve our nation. I see those years of active-duty training and experience, which could have been wasted being used to maintain and fly aircraft and, above all, to train new enlistees in various skills that make their active-duty schooling more meaningful. I see a "group" pride and dedication that are seen among that select group of dedicated active-duty career personnel.

Gen. Duane Cassidy, MAC Commander in Chief, presented our unit with the first of eight C-141Bs on July 12, 1986. We are the first unit not on active duty to receive these aircraft. This is only one of my unit's firsts.

The Guard is a definite credit and positive plus to the US Air Force and our nation, and I am proud to be a member.

The next time that any of our active-duty counterparts sees a C-141 taxi on their ramp with "Mississippi Air Guard" stenciled over the wheel well, they can be assured of finding a proud professional crew flying a first-class aircraft that has been put in the air by a first-rate ANG unit.

SSgt. William C. Smith
MissANG
Jackson, Miss.

• For more on the delivery of C-141B aircraft to the Guard and Reserve, see the item in "Aerospace World" on page 40 of this issue. Also in this issue, the articles "No Secret to Success," "Citizen-Airmen Do It Right," and "Manpower, Missions, and Muscle" highlight Guard and Reserve capabilities and achievements. THE EDITORS

Burtonwood

I am currently researching the history of the now disused Burtonwood airfield, used by the USAAF during World War II. I would be particularly interested in copies of old maps, runway layouts, base newsletters, photographs, or in contacting any ex-GIs stationed at the base during World War II.

This information is intended for my own use and is not for publication. Please contact me at the address below.

R. J. Monaghan
36A Ashton Ave.
Rainhill
Merseyside L35 0QG
England

Remember Pearl Harbor?

For a book in progress evoking December 7 and 8, 1941, I would appreciate first-person accounts (or references to them) from persons whose experience of those days, from anywhere in the world, was war-related and memorable.

Please contact me at the address below.

Stanley Weintraub
Institute for the Arts & Humanistic Studies
Pennsylvania State University
University Park, Pa. 16802

Service in England

The BBC is making a series of documentaries about relations between Britain and America in this century. The producers would very much like to hear from members of USAF who have memories of any time they spent in England between 1958 and 1973.

Please contact the address below.

Anne Hartmayer
BBC-TV
630 5th Ave.
New York, N. Y. 10111

Fifteenth Air Force

I am interested in corresponding with former members of the Fifteenth Air Force stationed in Italy. I am interested in learning about unauthorized night flights to Palestine carrying ammunition for the underground there.

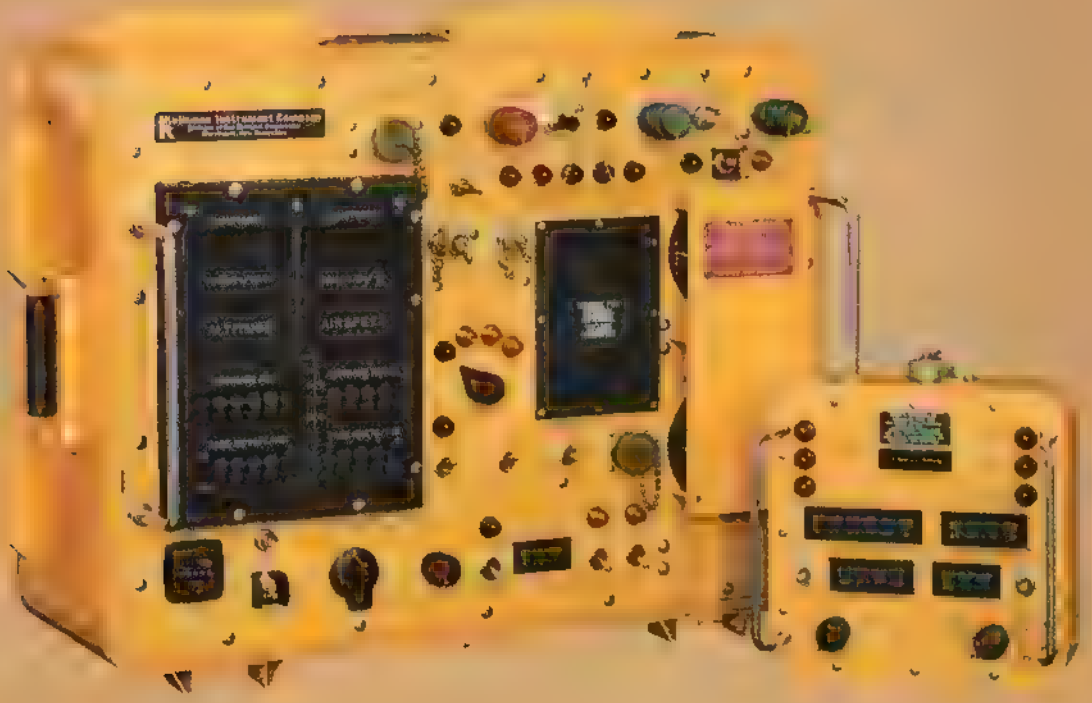
Please contact me at the address below.

Howard F. Jackson
117 Second St.
Garden City, N. Y. 11530

Auditors in Vietnam

I am researching the topic of Air Force military auditors and their activities in Vietnam and Southeast Asia. I would like to hear from former auditors, commanders, or anyone else having information that I might

Flightline Ready



FLMTS (Flight Line Maintenance Test Set) is portable and brings Kollsman precision to flightline testing of pneumatic flight instruments, air-data computers and engine-pressure-ratio systems. (Military designation: TTU-205.)

Suitable for civil or military aircraft, FLMTS's "flight envelope" ranges from -1500 to 80,000 ft and from 20 to 1000 kt. Altitude accuracy to 10 ft or 0.1%.

Optional remote control allows full functional pitot-static testing by one person.

For full details of FLMTS, write or call the Avionics Marketing Manager.

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A-7 STRIKEFIGHTER

A new A-7, re-engineered and ready to deliver a new standard in Close Air Support/Battlefield Air Interdiction

Already a legend in its ability to deliver weapons accurately and efficiently, the celebrated A-7 Corsair is being remanufactured from the ground up. Its original builder, Vought Aero Products Division of LTV Aerospace and Defense Company, is giving it more of everything it needs to perform the CAS/BAI role well into the 21st century.

The basic airframe belongs to the rugged, performance-proven A-7 Corsair. But from there on out, it's different. It will have more power, more performance and punch, straight across the board. A new high-thrust afterburning engine with double the thrust of existing A-7's. Automatic maneuvering flaps, wing strakes, and the most advanced avionics package ever developed for navigation and weapons delivery.

More performance everywhere it counts

From takeoff to touchdown, the A-7 Strikefighter will demonstrate capabilities equal to any CAS/ BAI requirements. Its takeoff roll is 45 percent shorter than the Corsair's. Its speed is 16 percent greater, topping off at Mach 1.2. It's more agile and responsive throughout its wider performance envelope.

While the Corsair can take enormous punishment, the Strikefighter can survive even more, with self-sealing fuel tanks, armor protection and redundant power control systems. And even with a full 15,000-lb. mix of bombs, rockets and 20mm "Vulcan" cannon, it can loiter on station for up to 1½ hours. And then deliver those weapons with devastating accuracy equal to anything in the air today.

Less than half the cost per copy

The Strikefighter's advantages reach from the bomb run to the balance sheet. Because the A-7 is an already-existing asset, its conversion can produce a fully capable Strikefighter at less than half the fly-away cost of a new fighter. And with trained people and equipment already deployed, its fielding and operating costs will be significantly lower. The U.S. Air Force will find the A-7 Strikefighter to be the most effective and affordable solution to its needs through the year 2010 and beyond.

LTV Aerospace and Defense
Vought Aero Products Division

L T V : L O O K I N G A H E A D

CHEAP SHOT

LTV's Hypervelocity Missile: Fast, accurate and affordable.

The column of enemy tanks is still several miles away when the attacking aircraft swings onto its firing run. Its FLIR is already tracking their heat signatures. Less than three seconds later, with the aircraft still safely out of range, the missiles slam into their targets with uncanny accuracy.

Low Cost, High Firepower

One of the most awesomely effective weapons ever developed for Close Air Support/Battlefield Air Interdiction, the Hypervelocity Missile (HVM) weapon system was designed to deliver maximum firepower at a cost far below anything in our current inventory. A product of Vought Missiles and Advanced Programs Division of LTV Aerospace and Defense Company, HVM is a masterpiece of simplicity and ingenuity. It carries no warhead, relying instead on its blistering 5000-foot per-second speed to blast a penetrator rod through heavy multi-plate armor, even at highly oblique angles at extreme range.

Its guidance system is a simple CO_2 laser, mounted on the aircraft. With only an aft-looking receiver on the missile, the amount of expensive "throwaway" hardware is held to an absolute minimum. And because HVM is a "wooden round" with no warhead, storage and handling are simpler, safer and cheaper.

Multiple Targets, Maximum Effect

The system can track and attack multiple targets simultaneously—any ground vehicle, fixed or mobile. In live fire tests an HVM was purposely aimed more than 100 feet off target. Automatic guidance brought the missile to impact near the target center.

With no bulky on-board guidance system or warhead, the HVM is small enough to permit a large loadout—up to 24 per aircraft, at a low installed drag.

No other weapon system has ever given the CAS/BAI pilot the HVM's unique advantages in speed, accuracy and survivability—advantages matched only by its cost-efficiency and low susceptibility to countermeasures.

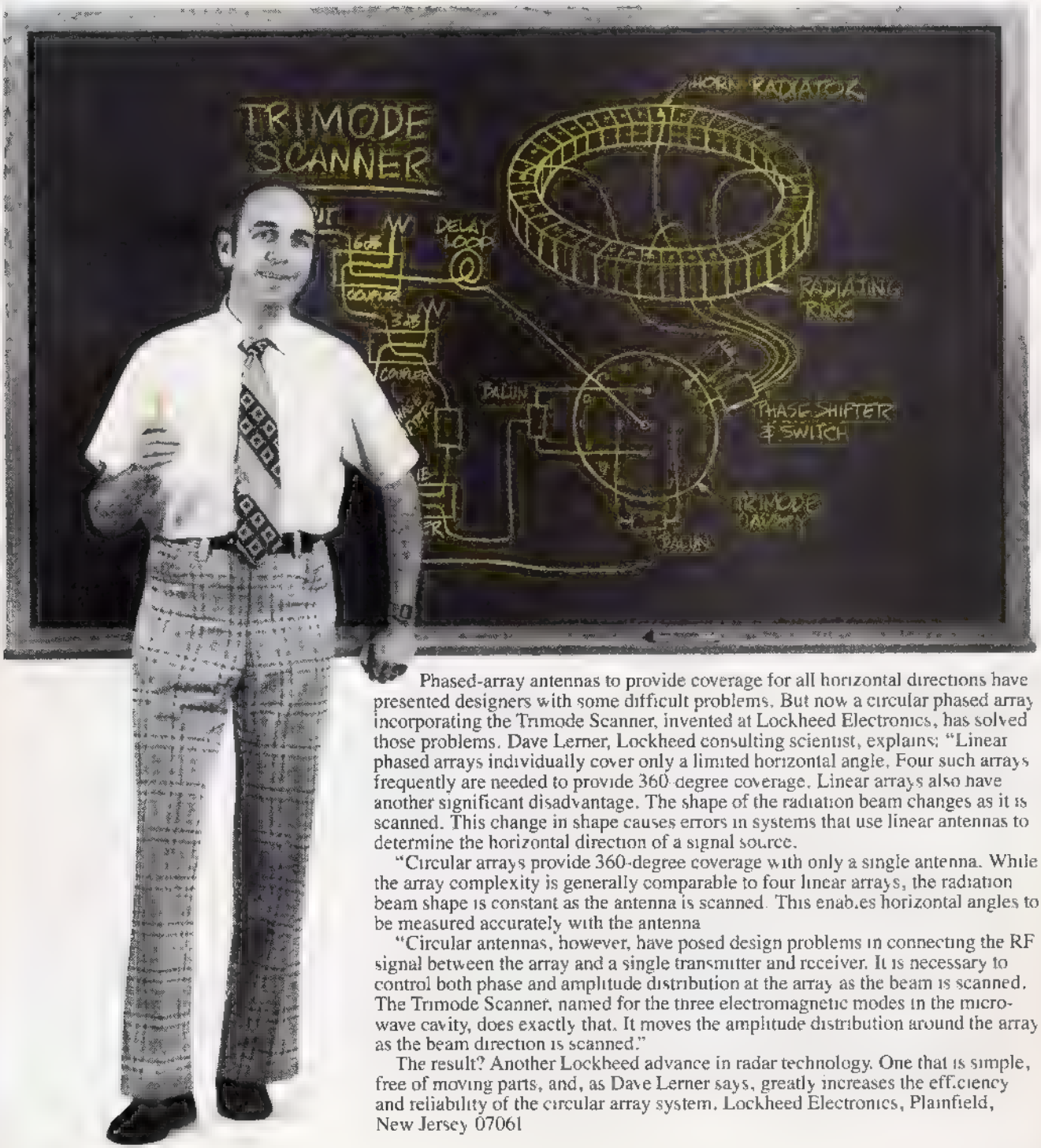
LTV Aerospace and Defense Company, Vought Missiles and Advanced Programs Division, P.O. Box 650003, Mail Stop MC-49, Dallas, Texas 75265-0003.

LTV Aerospace and Defense

Vought Missiles and Advanced Programs Division

L T V : L O O K I N G A H E A D

Dave Lerner on a new approach to omnidirectional coverage.



Phased-array antennas to provide coverage for all horizontal directions have presented designers with some difficult problems. But now a circular phased array incorporating the Trimode Scanner, invented at Lockheed Electronics, has solved those problems. Dave Lerner, Lockheed consulting scientist, explains: "Linear phased arrays individually cover only a limited horizontal angle. Four such arrays frequently are needed to provide 360-degree coverage. Linear arrays also have another significant disadvantage. The shape of the radiation beam changes as it is scanned. This change in shape causes errors in systems that use linear antennas to determine the horizontal direction of a signal source.

"Circular arrays provide 360-degree coverage with only a single antenna. While the array complexity is generally comparable to four linear arrays, the radiation beam shape is constant as the antenna is scanned. This enables horizontal angles to be measured accurately with the antenna.

"Circular antennas, however, have posed design problems in connecting the RF signal between the array and a single transmitter and receiver. It is necessary to control both phase and amplitude distribution at the array as the beam is scanned. The Trimode Scanner, named for the three electromagnetic modes in the microwave cavity, does exactly that. It moves the amplitude distribution around the array as the beam direction is scanned."

The result? Another Lockheed advance in radar technology. One that is simple, free of moving parts, and, as Dave Lerner says, greatly increases the efficiency and reliability of the circular array system. Lockheed Electronics, Plainfield, New Jersey 07061

Lockheed Electronics

Innovation
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Resupply armor right to the front.

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With Hercules, that radio message can bring armor and decisive firepower right to the men who need it, no matter where they are. Even if there's not a level spot for miles. Because anywhere is where the Herc can deliver. Anytime.

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Defense Electronics

...where technologies are many, and requirements increasingly complex.

A leader in electronic defense, Loral today is developing creative new "system solutions" for next-generation electronics for Airborne and Shipboard Defense, Airborne Early Warning and Surveillance, C^3I (Command, Control, Communications and Intelligence), Laser-Based Simulation and Microwave Integrated Assemblies.

Loral. A national resource in defense electronics.

Loral Corporation, 600 Third Avenue, New York, NY 10016

LORAL

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SCOTT—THE C4I SURVIVOR
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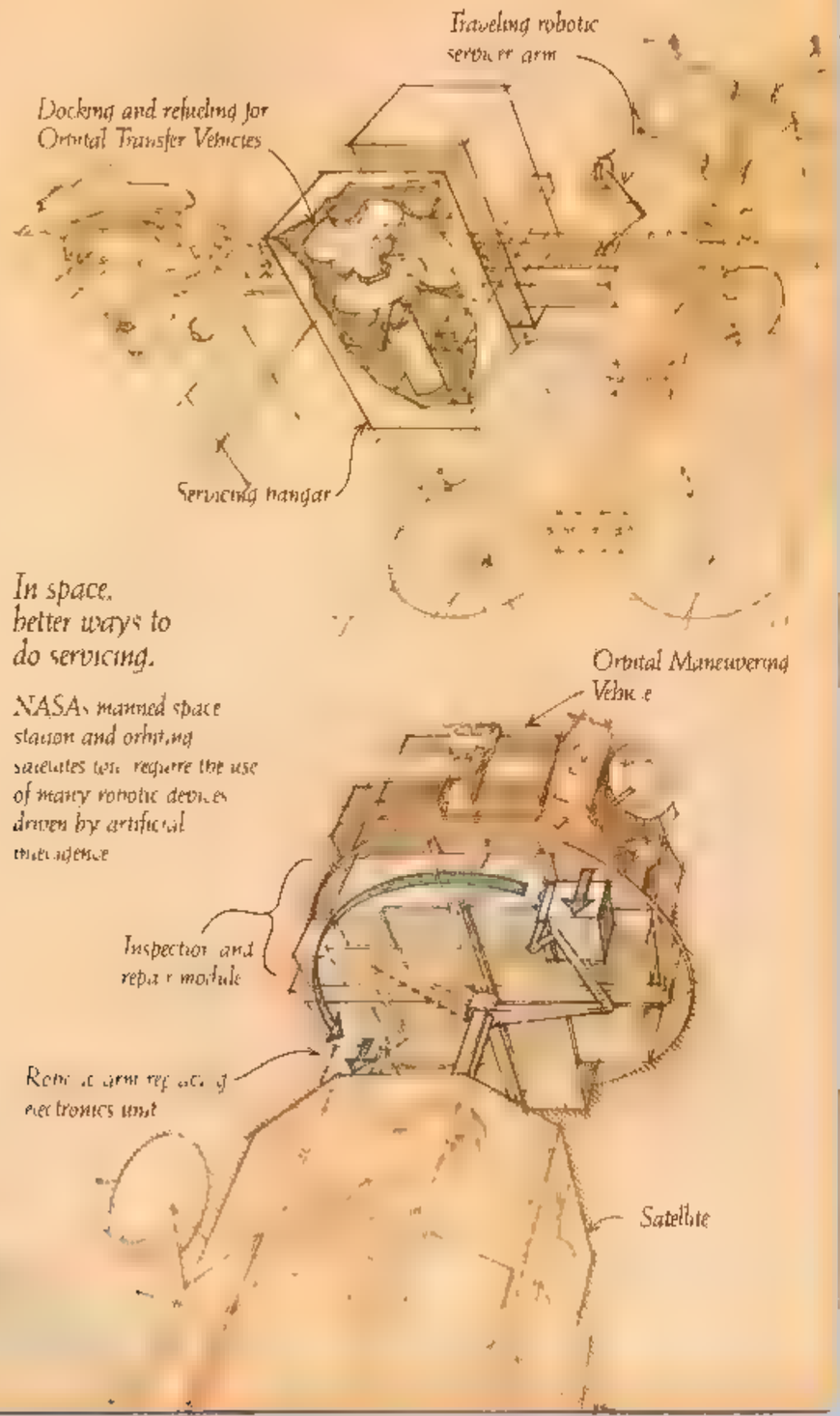
Electronic Systems Company
Northern Virginia Systems Group
2829 Ashburn Road
Ashburn, Virginia 22035
(703) 478-4000

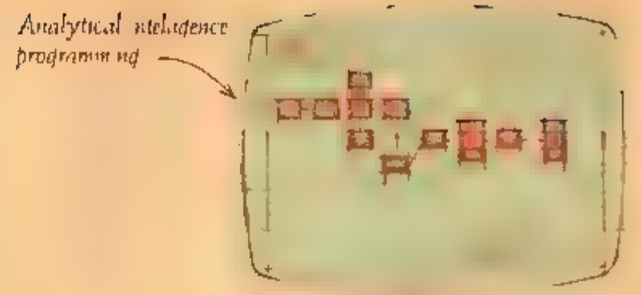
Artificial intelligence and robotics giving machines the ability to sense, reason and act

Much as it may hurt to think so, many things might be done better by independently functioning machines than by humans. Certain tasks may require superhuman precision or speed, or need to be done where humans can't go. Martin Marietta is creating systems that combine the ability to sense, reason and take action — to function autonomously and intelligently. And we are exploring ways to put them to work on a variety of tasks.



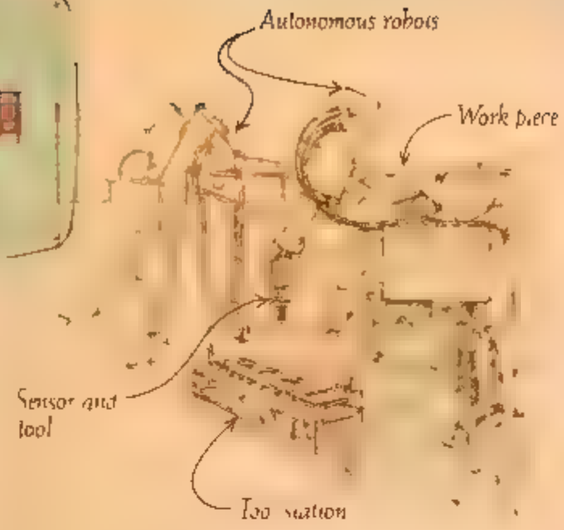
In space, better ways to do servicing.

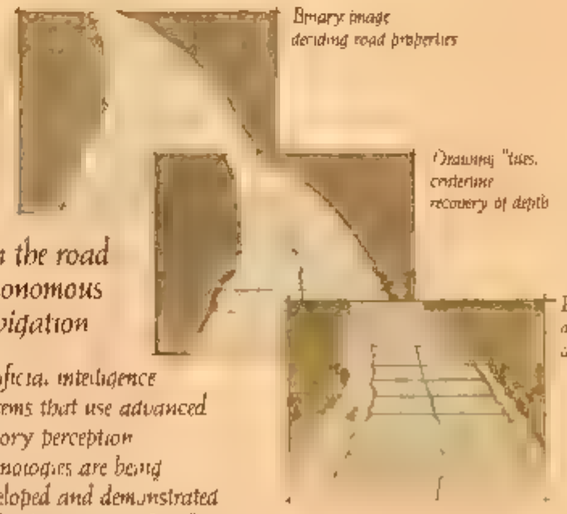
NASA's manned space station and orbiting satellites will require the use of many robotic devices driven by artificial intelligence.



On earth faster manufacturing and inspections.

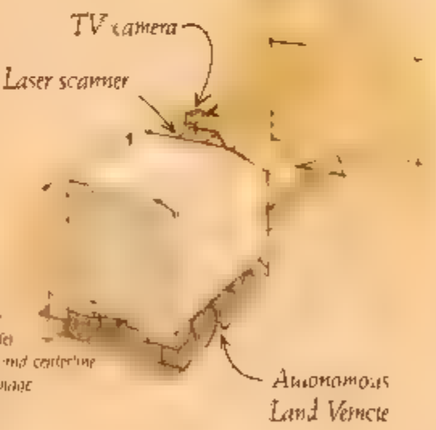
With creative intelligence stemming from software that we are developing, autonomous robots can quickly and efficiently perform batch manufacturing and precision inspections, even choose their own tools.




Binary image deriving road properties
Drawing "lines," centerline recovery of depth
Boundaries, direction and centerline of TV image

On the road autonomous navigation

Artificial intelligence systems that use advanced sensory perception technologies are being developed and demonstrated in the Autonomous Land Vehicle. A ready able to follow roads, this mobile test bed will eventually be able to plan its route, avoid obstacles and even thread its way across country.

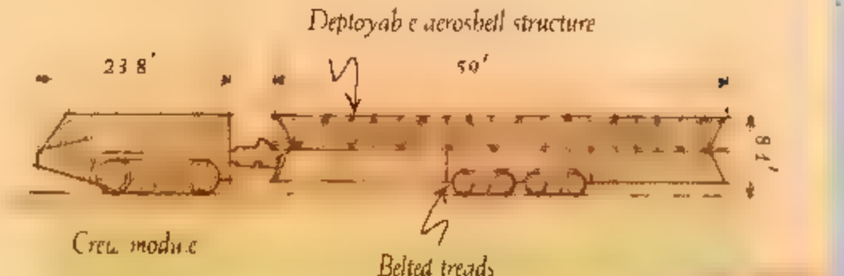


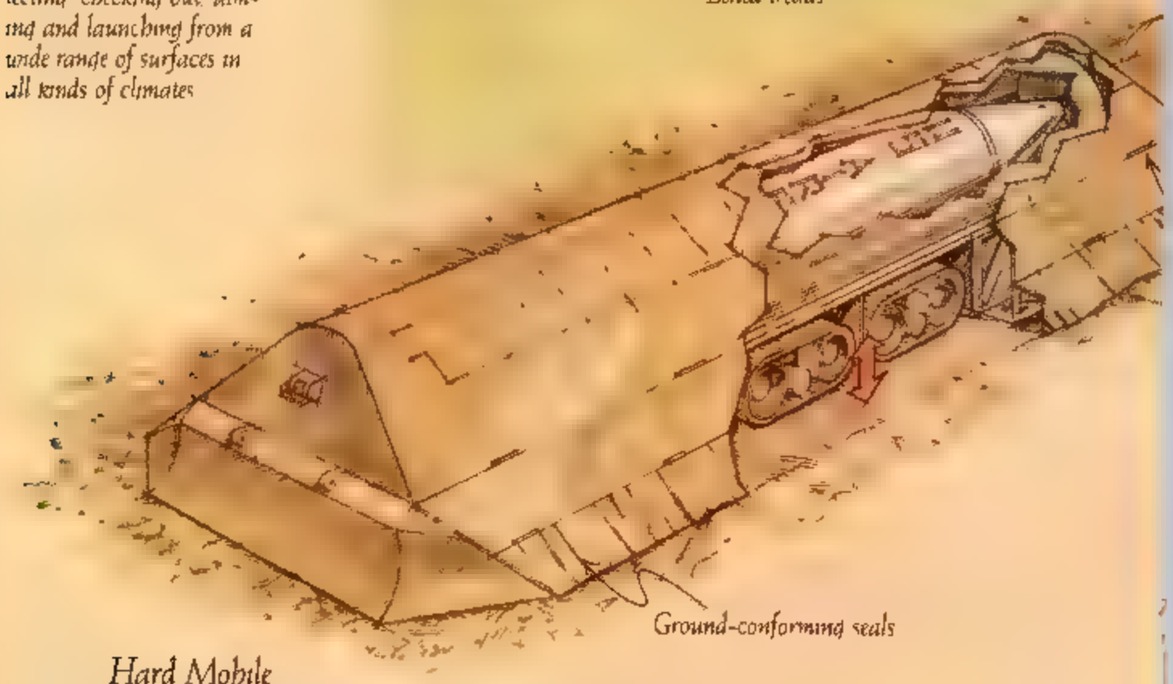
MARTIN MARIETTA

Martin Marietta Corporation
6801 Rockledge Drive, Bethesda, Maryland 20817, USA

Missile launchers that go just about anywhere.

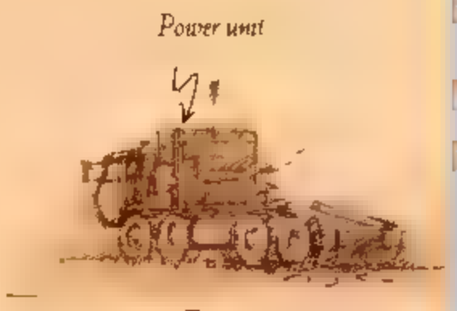
A missile system's effectiveness can depend heavily on high mobility as well as survivability. In some 30 years of meeting these two goals, Martin Marietta has addressed virtually all of the engineering and integration challenges facing planners of next-generation mobile missiles. These issues include transporting, protecting, checking out, aiming and launching from a wide range of surfaces in all kinds of climates.





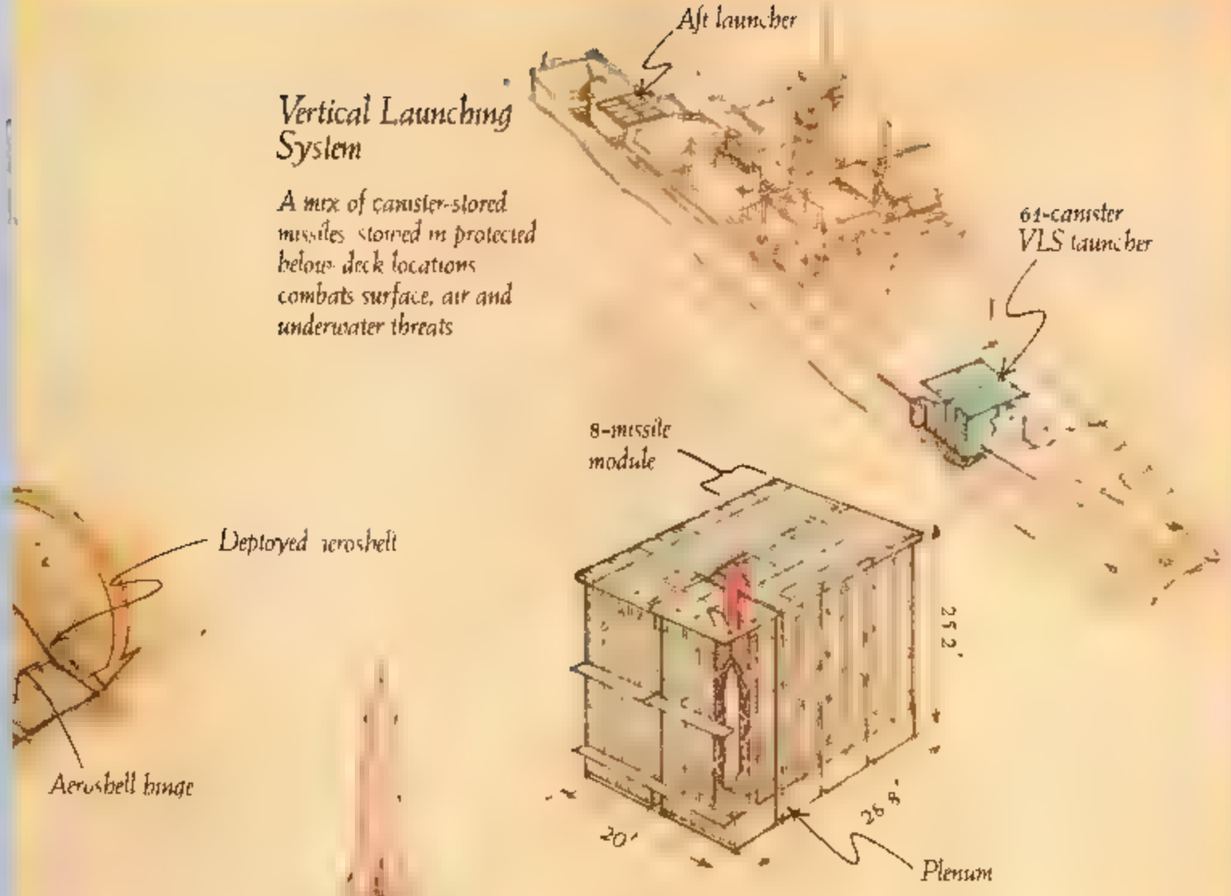
Hard Mobile Launcher

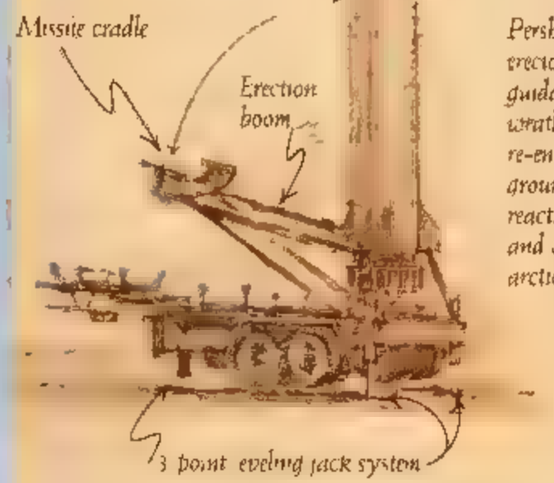
With belted treads for maximum on/off road, all-weather mobility, this launching system for the Small ICBM requires no site preparation.



Vertical Launching System

A mix of canister-stored missiles stowed in protected below-deck locations combats surface, air and underwater threats.





Pershing II Transporter/launcher

Pershing II, with its mobile erector/launcher, inertial guidance system and all-weather terminally guided re-entry vehicle, provides ground forces with quick reaction firepower in terrain and climates ranging from arctic to desert.

MARTIN MARIETTA

Martin Marietta Corporation
6801 Rockledge Drive, Bethesda, Maryland 20817, USA

The Perfect 10

demonstrating its exceptional performance, reliability and cost effectiveness every day.

The KC-10 consistently achieves superior performance standards.

possible rating—"Outstanding"—in all ten semiannual performance evaluations conducted by the Air Force.

the Air Force ordered. And more.

KC-10. Promises Delivered.

THE F-15: KEY PLAYER ON THE USAF TEAM.

THE MISSION: RAPID DEPLOYMENT. GET U.S. AIR FORCE AIRPOWER TO ANY TROUBLE SPOT IN THE WORLD. FAST. Rapid deployment is a crucial USAF mission required to meet our global commitments. Why? Because situations that require USAF support can occur anywhere in the world with little warning.

Rapid deployment requires versatile and reliable fighters that can travel great distances to get to the fight.

The USAF chose the F-15 Eagle for the rapid deployment mission. The Eagle has the range and speed to reach any area in the world quickly and safely. Its conformal fuel tanks allow it to travel between continents without refueling. It's the only U.S. fighter ready to meet the broad spectrum threat in the world now and through the 1990s. Its combat readiness and safety record is excellent.

For a strong defense, America counts on the USAF. And the USAF counts on the F-15 Eagle.

BLITZ.

McDONNELL DOUGLAS

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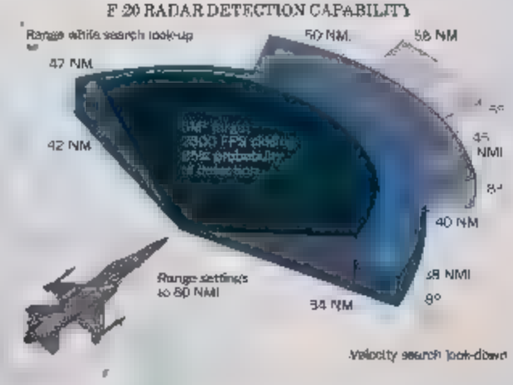
The F-20 detects, acquires and prioritizes up to ten targets. Displays the eight most critical. Positive target identification. Day, night or adverse weather. Launches on targets beyond visual range.

Carries AIM-7, AIM-9, AIM-120 AMRAAM. With AIM-120, can simultaneously engage multiple targets.

All required switches and controls on the stick and throttle.



F-20 Tigershark

America's Newest Tactical Fighter

Northrop Corporation
1840 Century Park East
Los Angeles, CA 90067 2199 USA

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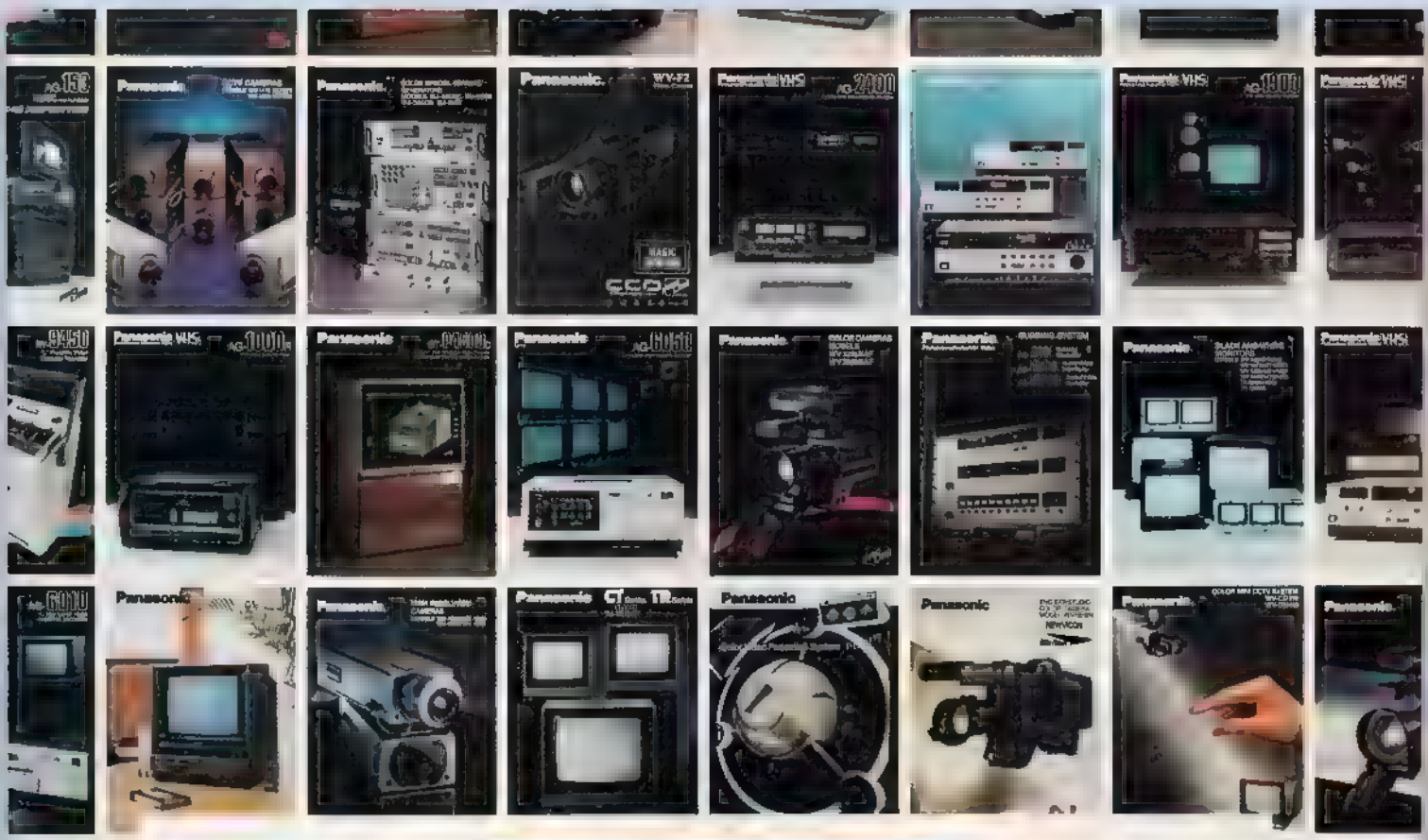

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When you come to Panasonic® for your industrial video requirements you're getting more than the world's largest selection of video components and accessories. You're also getting the quality and reliability that has long been a trademark of Panasonic.

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For sophisticated productions Panasonic has just what you need, including a wide variety of single-tube and three-tube cameras as well as special-effects generators and ½" and ¾" editing systems.

For documentation, there are a variety of lightweight cameras and portable VHS recorders and camcorders. All with features to make documentation simple and fast. Like One-Touch Recording, Automatic White Balance and Auto-Focus.

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Surveillance

For your security and surveillance operations Panasonic offers a wide choice of CCTV components. Choose from Vidicon and Newvicon® cameras in both color and black and white. There are small and ultra-durable solid-state color and black and white cameras, time-lapse VCRs and, of course, monitors in virtually every size and every configuration.

By now it should be clear there's only one name you need to know in industrial video. Panasonic.

For more information and your copy of the Authorized Communications Schedule Price List contact your local Panasonic Industrial Video dealer or call (703) 486-5533 (FTS (202) 486-5533) or write to Government Marketing Dept. Panasonic AVSG, Suite 901, 1215 Jefferson Davis Highway, Arlington, VA 22202-4302.

Panasonic
Industrial Company

nformation: Pilatus Aircraft Limited CH-6370 Stans, Switzerland, Tel. 041 - 63 61 11, Telex 866 202, Telefax 041 - 61 33 51

AEROSPACE WORLD

Mich., has been named winner of the **Koren Kolligian Trophy** for 1985. The Kolligian Trophy is awarded annually to the Air Force aircrew member who most successfully coped with an in-flight emergency during the preceding calendar year.

Retired **Maj. Gen. Donald W. Henderson,** former Commander of the Space and Missile Test Organization at Vandenberg AFB, Calif., was awarded the **Gen. Thomas D. White USAF Space Trophy** for 1985 by the award's sponsor, the National Geographic Society. The White Space Trophy is given for outstanding contributions to the nation's progress in aerospace during the previous year. General Henderson was cited for his role in molding a strong management relationship among the partners associated with the launching of DoD Shuttle payloads from the Kennedy Space Center and also for directing the activation and checkout of Space Launch Complex Six (SLC-6) at Vandenberg.

★ **MILESTONES**—An era ended on June 6 when the **last active-duty chief warrant officer in the Air Force, John Cronise,** retired after a forty-three-year career. The Army Air Forces implemented the warrant officer program during World War II as a way to recognize technicians who had special skills in assigned fields. With the introduction of E-8 and E-9 grades in the Air Force in 1958, warrant officers were phased out. Mr. Cronise enlisted in 1943, and after separating in 1946, he joined the Oregon National Guard. He was recalled to active duty during the Korean War and then again last April when the Oregon Guard was called up to assume the round-the-clock quick response alert mission with the 86th Tactical Fighter Wing at Ramstein AB, West Germany, which is in the process of converting to F-16s. The last whole-career active-duty CWO retired in 1982, but there's still a handful of warrant officers in the Guard.

With four aircraft now delivered to the 433d Military Airlift Wing at Altus AFB, Okla., the Air Force's **Lockheed C-5B fleet** passed the **1,000 hours of flight time** plateau in mid-June. The four aircraft are now being used for flight crew training and will be joined by five more of the giant transports by the end of the year.

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Because Second Chances Aren't Part of the Mission.
A complete family of cartridge loaded data entry systems for severe military environments. Extraordinary in every respect.
All meet or exceed MIL-E-5400 for shock, vibration and operating temperature (−54° to +71°C) and include nuclear hardening. In fact, Raymond tape loaders out-perform the competition consistently in all types of real world military applications.
Capacities are available from 12 to 288 Mbits with system weights from 5 to 8 lbs. And a correspondingly small envelope allows installation even where space is at a premium.
Raymond offers proven performance with thousands of hermetically sealed plug-in tape cartridges fielded, supporting over 130 military programs in areas such as Stealth, EW, Battlefield Management, C³I, ELINT and Tactical Aircraft Ops.
If you have requirements for data handling, we'd like to talk to you. Chances are we have a system to meet your needs. For more information please call:
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Raymond Engineering Inc.
Military Memory Systems
217 Smith Street, Middletown, CT 06457
(203) 632-1000

After a flight from Rickenbacker ANGB, Ohio, the **last Fairchild UC-123K Provider** was retired to the Military Aerospace Maintenance and Regeneration Center at Davis-Monthan AFB, Ariz., on June 17. The Air Force Reserve's 907th Tactical Airlift Group—the only aerial spray unit in the Air Force—has flown the aircraft since 1973. The 907th TAG, which sprayed 735,000 acres in Idaho for insects during a thirty-day period in 1985, will now use modified C-130A aircraft for its war on bugs.

After much political wrangling, the **first of five Boeing E-3A Sentry** Airborne Warning and Control System (AWACS) **aircraft was delivered to the Kingdom of Saudi Arabia** on June 30. Prince Bandar bin Sultan, the Saudi ambassador to the US, accepted the plane before it left the Boeing plant in Seattle for an eighteen-hour flight to the Middle East. The plane

PROTOTYPES mean b etter performance, lower risk

ATF

Rockwell International

...where science gets down to business

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NORTH AMERICAN AIRCRAFT OPERATIONS

THE RIGHT STUFF

How in future will student pilots learn to fly with aggression and confidence into the blue without putting the training budget into the red?

Introducing the Adour in the T-45A 'Goshawk' trainer for the U.S. Navy.

The T-45A with the uniquely-designed Adour turbofan, enhances the student pilot's flying skills.

While it will help train 600 pilots a year, 42% fewer aircraft will be needed.

25% fewer flight hours 15% less time to train, which add up to high percentage savings on in-flight training.

The Adour has exactly the right cycle for low fuel burn and high thrust through the flight envelope. Slipping 60% less fuel than the Navy's current trainers.

What's more, the Adour's modular design helps reduce downtime and gives a 20% reduction in spare engine requirements.

And while the student will enjoy freedom of engine handling to manoeuvre like a member of the famous Red Arrows aerobatic display team, the end result will be training at half the cost.

So while the student will be learning, the U.S. Navy will be saving. Megabucks.

This evolved engine has over 2 million flight hours training pilots, in the most extreme conditions worldwide. No wonder the T-45A was the winning candidate in the U.S. Navy VTXTS competition.

It's the very stuff of the right stuff.

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THE RIGHT COUNTERMEASURE AT THE RIGHT TIME

Tomorrow's tactical aircraft will be faster, smarter and more lethal than ever before. . . against an air defense capability unequalled today.

To succeed and survive, tomorrow's pilot must rely on the support of an integrated countermeasures system to deliver the appropriate response to the threat precisely when needed.

The Integrated Electronic Warfare System (INEWS) will deliver that response, and the Sanders/General Electric Team is the most qualified to deliver INEWS.

The Sanders/GE Team has the technology, the Electronic Warfare experience and the engineering resources to meet the challenges of tomorrow's threat environment.

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THE RIGHT BALANCE

The U.S. Air Force has initiated a program to procure a new Automatic Depot Inertial Navigation Test System called ADINTS. This generic, long-term test capability will replace older test systems in accordance with the Air Force's MATE guidelines

ADINTS requires:

- Unique knowledge of the Prime Equipment and its test procedures
- Familiarity with the end-user environment.
- Extensive Avionics Automatic Test Equipment experience.
- Demonstrated MATE expertise.

To meet these challenging requirements, Singer's Kearfott Division and Harris Corporation's Government Support Systems Division, have formed a partnership to provide the right balance of capabilities to ensure ADINTS success.

Singer's Kearfott Division has pioneered the development of inertial navigation systems and components Over the last 25 years, more than 36,000 systems have been delivered including all of the current units to be tested on ADINTS

Harris' Government Support Systems Division has over three decades of test system experience and is the military's leading supplier of avionics test equipment

At Harris MATE is already underway as an internally funded program that successfully demonstrated a fully compliant MATE system from the ground up.

The Singer/Harris commitment to ADINTS has all the elements necessary to fulfill current and future Air Force needs for an organically supportable MATE compliant inertial depot.

Directly applicable experience, technology, and reliability in design provide the right balance.

AIR FORCE

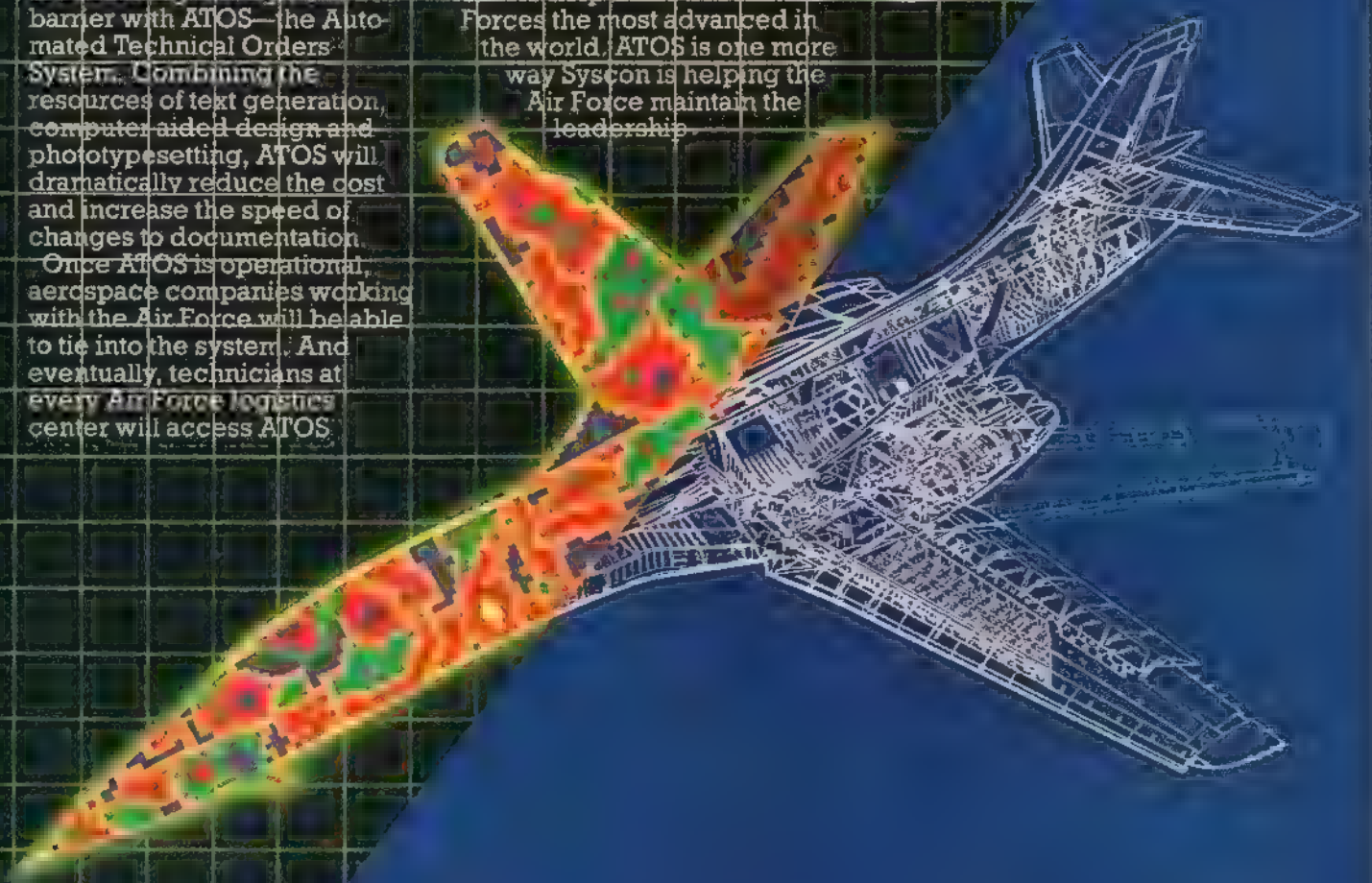
Today, standing in the way of every Air Force advance in technology, is a paperwork barrier.

But the Air Force and Syscon are breaking through that barrier with ATOS—the Automated Technical Orders System. Combining the resources of text generation, computer-aided design and phototypesetting, ATOS will dramatically reduce the cost and increase the speed of changes to documentation.

Once ATOS is operational, aerospace companies working with the Air Force will be able to tie into the system. And eventually, technicians at every Air Force logistics center will access ATOS through terminals for instant information on systems operation and maintenance.

Since 1966, Syscon and the U.S. Military have worked as a team to help make our Armed Forces the most advanced in the world. ATOS is one more way Syscon is helping the Air Force maintain the leadership.

SYSCON
CORPORATION
1000 Thomas Jefferson Street, N.W.
Washington, D.C. 20007



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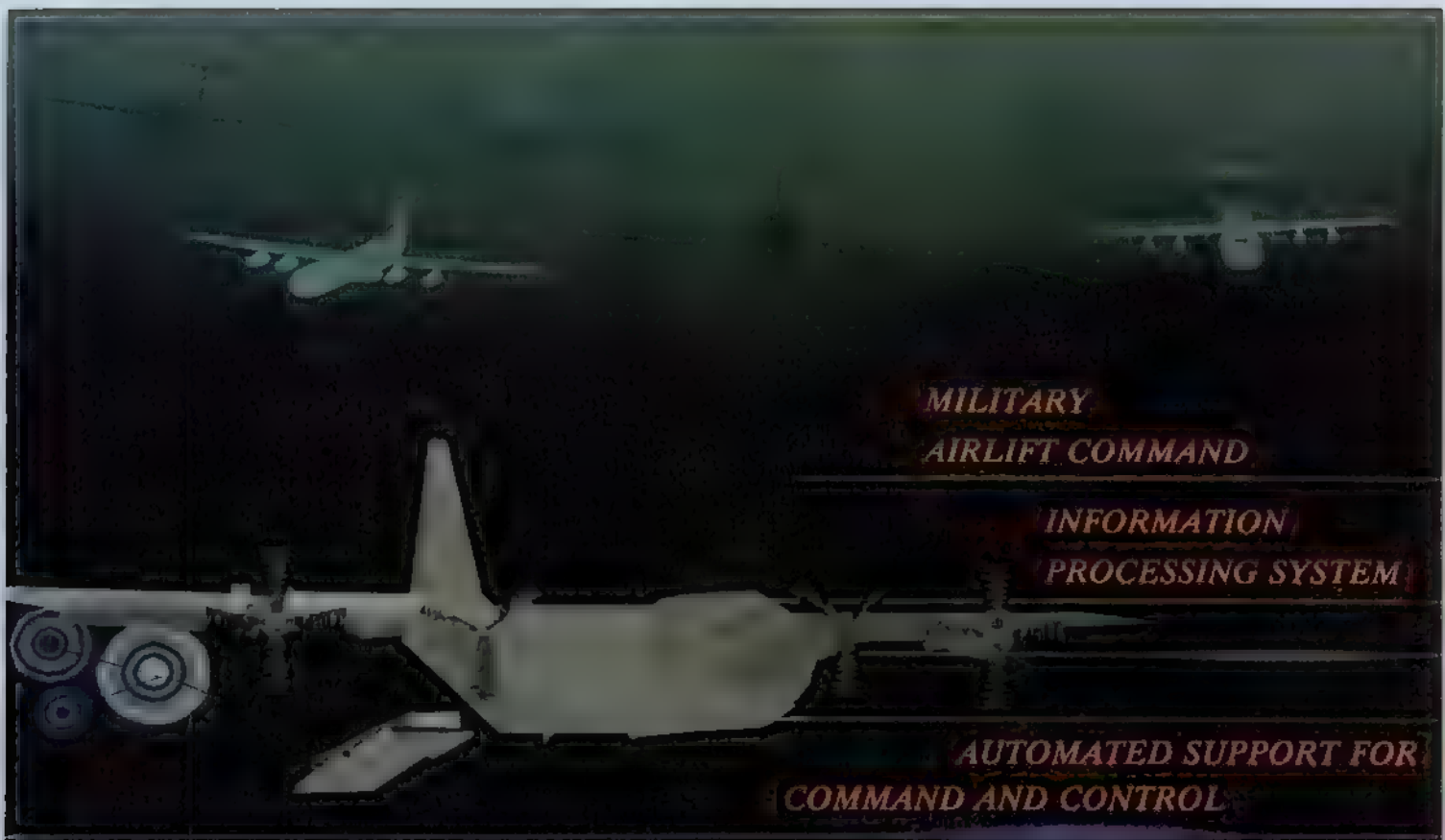

We Deliver

Command and control for the world's largest airlift operation, the Military Airlift Command (MAC), is more than just scheduling a few flights. It's thousands of missions, scheduled and executed worldwide. The MAC Information Processing System (MAC IPS) will link command and control centers all over the world, and will provide automated support to aid airlift operators in planning, scheduling and executing MAC's airlift missions.

Building this complex system of fixed and transportable nodes is a tough job. TRW has assembled the team that has the depth and breadth of experience to solve the problem. And, we have the tools to build the system, proven expertise in workstations, local area networks, software development, algorithm design, data base management, and system integration.

Our teammates are ready as well. E-Systems has been providing communications capabilities to MAC for many years, bringing expertise in multimedia network implementation and communications processing. BETAC and RAI are old hands at airlift operations. Our team has developed simulations of mission operations and communications and built prototype workstations to give us a headstart on this evolutionary acquisition.

Now, we're ready to build the system, integrating off-the-shelf hardware and software as only TRW can, to create a system that works. We are a leader in using Ada® for complex C2 programs. Our rapid prototyping and advanced workstation concepts will aid in understanding the users' needs, and in building a system which has user acceptance. Our simulator provides insight into system operation and system sizing.

No other team can deliver full life cycle support. From evolutionary requirements definition to installation, operation and maintenance, the TRW team—E-Systems, BETAC and RAI—delivers the goods.

TRW

TRW Defense Systems Group

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Artificial Intelligence

Problem: Help military decision-makers decipher an overpowering on-rush of data.

Solution: TRW Artificial Intelligence

Computer-automated intelligence workstations are powerful tools to better understand the battlefield. But, too much data came pouring through the first intelligence fusion devices; analysts couldn't keep up. Humans, it seemed, might be the weak link.

TRW determined the problem; operator cognitive overload. There was simply not enough time to form good hypotheses, a key step in understanding the complicated displays. TRW's approach was to apply artificial intelligence and build a hypothesis generator, an aid to analysts navigating the swollen data stream.

With TRW-developed techniques of knowledge engineering, we extracted the rules expert analysts use in formulating hypotheses. These rules were programmed into a workstation. Analysts could alter the rule-base to determine how conclusions are reached. Now we're creating an intelligent man-machine interface which can sense the operator's mission and automatically tailor the screen to specifically support it.

TRW is turning these techniques to real military tasks. TEMPLAR, the Tactical Expert Mission Planner, a decision-aid for the operational user is one of the largest AI contracts. The machine will aid in the allocation of Air Force resources for tactical strike mission planning. We are working to apply these same AI techniques to the Army's air-land battle management problem. Our expert systems techniques have application in integrated diagnostics, strategic mission planning, and a whole host of other expert decision-making systems as well.

TRW is at work where the minds of men and machines most ultimately meet.

TRW

TRW Defense Systems Group

© TRW Inc. 1985

There's never been a switch this versatile in a package this small.

You can program our rad-hard VHSIC matrix switch to interconnect any of eight 4-bit output ports with any of eight 4-bit input ports. The chip's crossbar design allows you to independently route data between memories and signal processing resources. And it all happens at a rate of 1.6 billion controllable switching operations per second.

The matrix switch is just one of many TRW VHSIC Phase 1 digital processing chips now available to U.S. defense contractors for engineering evaluations. The chip set, which includes both CMOS and bipolar circuits, includes chips for handling a wide variety of high speed sorting, arithmetic, memory, and interconnect functions.

Like other TRW VHSIC chips, the matrix switch features unique, programmable pipeline registers and built-in diagnostic test features; not only can you fine-tune the chip's architecture to match your military processing requirements, but you also can test and evaluate your systems down to the chip level.

We'll also support your efforts with design tools ranging from data sheets and simulation software to brassboard adapter boards and full-on applications engineering.

TRW VHSIC
The last chip set your systems may ever need.

VHSIC Chip Sales Manager
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Redondo Beach, CA 90278
213.536.2205

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TRW Electronic Systems Group

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anti runway weapon system

BAP 100

To neutralize enemy aircraft on the ground whilst leaving no stretch of runway more than 1,000 m long and 15 m wide.

- Optimal aircraft loading: 18 bombs under just one pylon (710 kg at one single carrying point). Other carrying points free for fuel, ECM, air-to-air missiles.
- Weapon-system adaptable to all combat-aircraft, including the lightest, whether they are fitted with a fire control system or not.
- Two weapon-systems in one:
  - with no adjustment, the adaptors installed on the aircraft can accommodate the BAP 100 or BAT 120 (tactical support bomb) indifferently;
  - in both cases less than 10 min is required to load the bombs on the aircraft.
- Weapon-system in service with the French Air Force

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ARMEMENTS

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AEROSPACE WORLD

the ionosphere. The aim of the two experiments is improved communications over the poles.

By using the "off-the-attic-shelf" satellite instead of building a new one, the Air Force saved more than $2 million. Another $6 million to $8 million was saved by using flight-qualified spare parts in the buildup of the Scout.

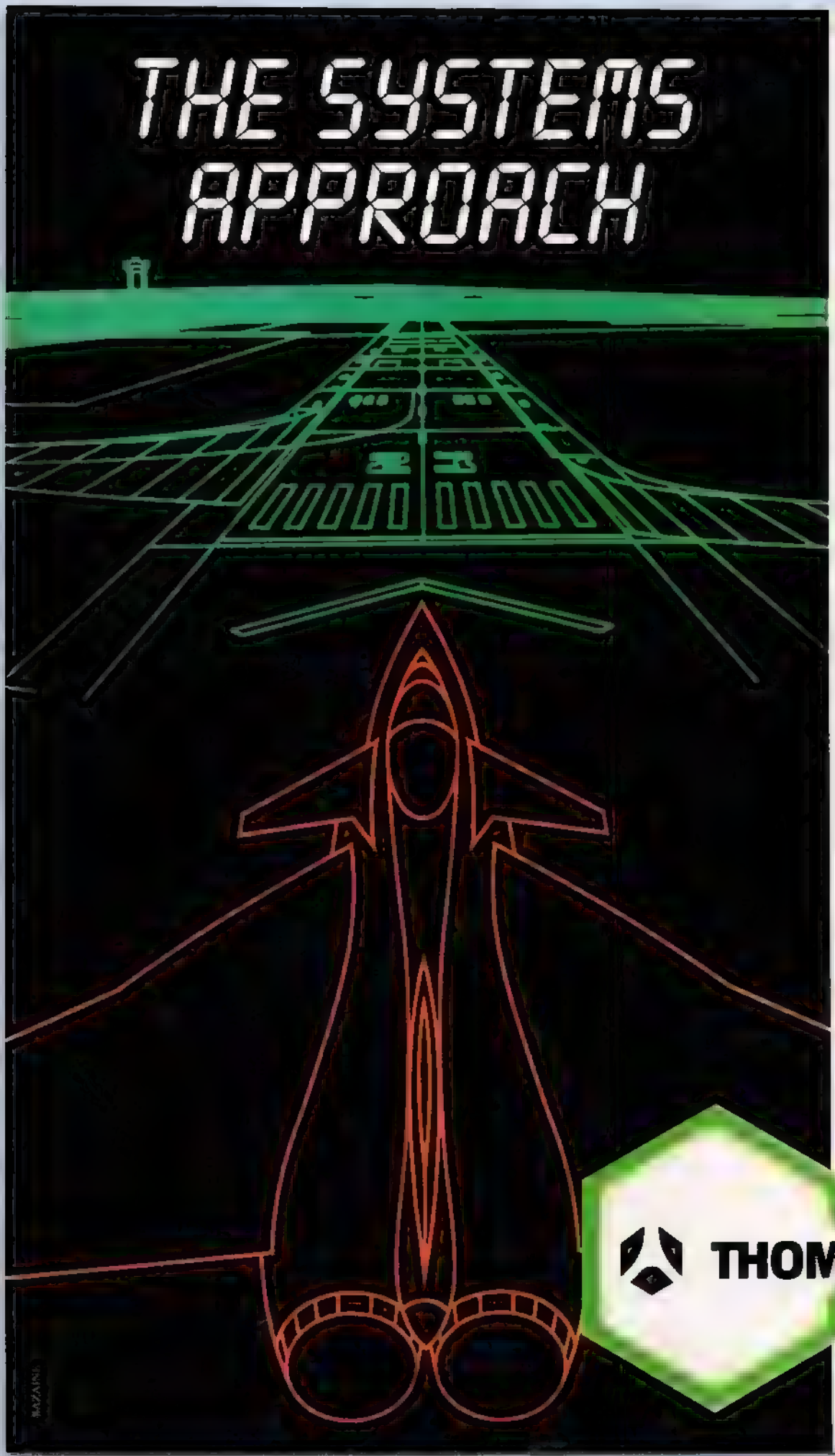
★ Airliners today fly coast to coast in a matter of hours. Seventy-five years ago this September, the journey took an intrepid thirty-two-year-old aviator named Calbraith P. Rodgers forty-nine days, seventy-six stops, eighty-two actual flight hours, and twenty crashes to make the trip from Sheepshead Bay, Long Island, N. Y., to Long Beach, Calif.

In September, thirty-seven-year-old James R. Lloyd will attempt to recreate Rodgerss "adventure" (without the crashes) in a modern Pterodactyl Light Flyer (a homebuilt) that is similar in appearance and performance to Rodgers's Wright EX biplane. Mr. Lloyd's flight is expected to take thirty-seven days.

Wearing period clothes, Mr. Lloyd will land in many of the same places where Rodgers stopped in 1911. The flight, as planned, will leave September 17 from Long Island, cross Ohio and Indiana into Chicago, fly on to Kansas City, then down to Dallas, and across the southwest to Long Beach.

To prepare for the flight, Mr. Lloyd has been practicing takeoffs and landings on cow pastures and country roads. He will have only limited flight instruments, and he will navigate by railroad tracks and major highways. Top speed of the new aircraft is fifty-five mph, and his altitude will rarely top 1,000 feet.

Rodgerss intentions for the cross-country trip were not entirely motivated by the honor of being the first person to fly across the continent. William Randolph Hearst, the newspaper magnate, had made an offer of a $50,000 prize to the first person who could fly coast to coast in thirty days. Rodgers persuaded J. Ogden Armour of Armour and Co. to sponsor him, and the Wright plane was named *Vin Fiz* to promote that company's new grape-flavored soft drink. The crashes and numerous days of bad weather prevented Rodgers from



Whether moving about in space or attempting to track aircraft from the ground, modern man would be lost without the aid of electronics.

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In a continuous effort to create new technologies to meet the users' emerging needs, the company keeps in constant touch with these users. THOMSON-CSF is continuously improving its airborne weapons systems, radiocommunications equipment, navigation aids, air traffic control and air defence systems, data-processing equipment, electronic warfare systems and simulators.

The systems concept means being able to provide an overall solution to the multiplicity of problems that users are faced with.

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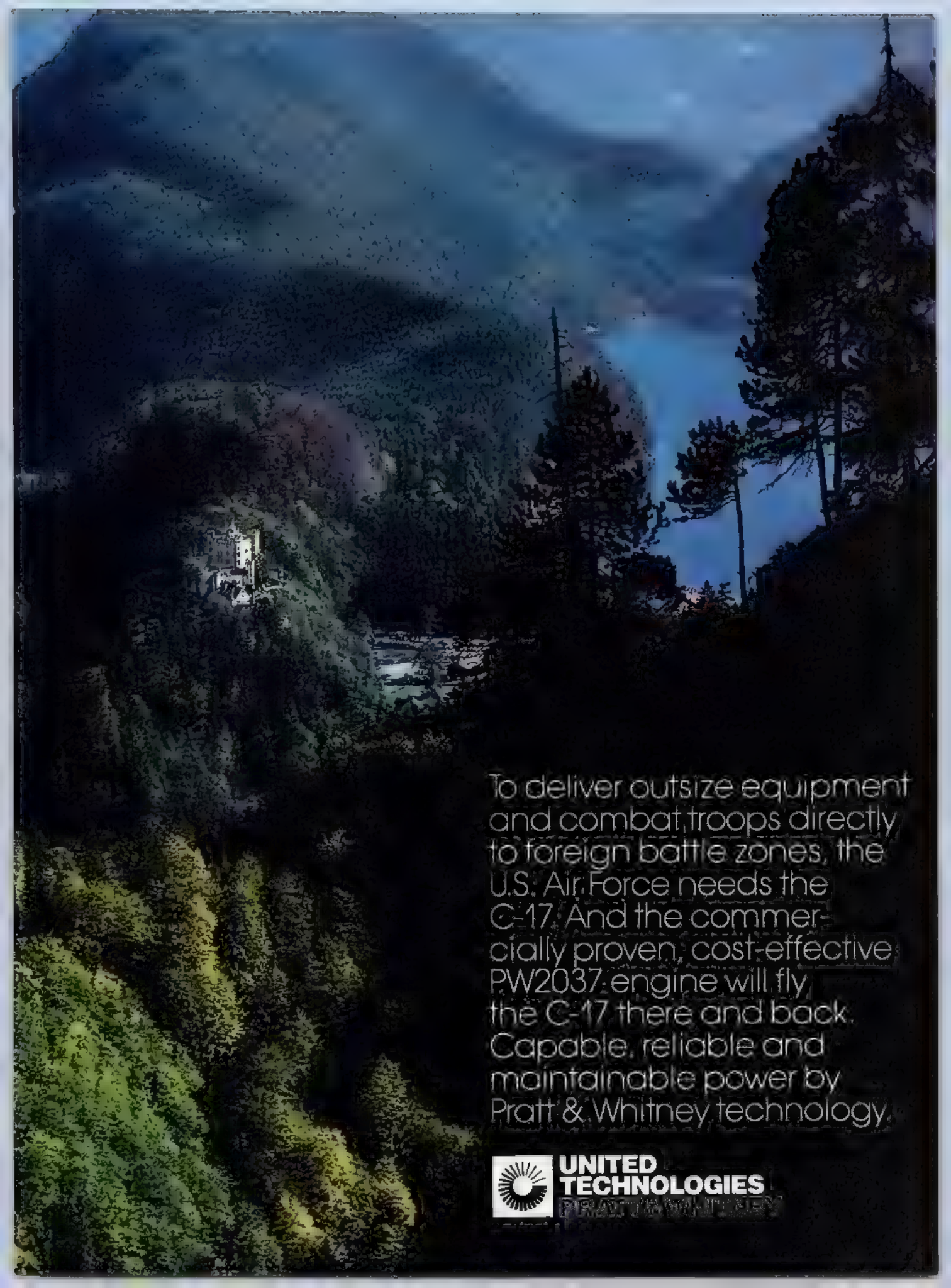
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be able to use in developing one or more articles on the subject.

Any stories, reminiscences, audit reports, or other documentation would be very much appreciated. If you request, I will copy all information sent and return the originals to the sender. Please contact me at the address below

Capt. Jim H. Crumpacker, USAF
PSC Box 2561
APO New York 09021

Moby Dick

I am a writer researching the Moby Dick and WS-119L balloon programs

I am interested in hearing from anybody involved in planning, operations, launch recovery, or analyses of the Moby Dick weather balloon flights (1952–53), the WS-119L reconnaissance balloon training flights (1955), the first operational flights (January and February 1956), test flights of the improved version (1957), and the second flight series (1958).

Please contact me at the address below.

Curtis Peebles
1164 E. Madison Ave
El Cajon, Calif. 92011

Collectors' Corner

I am a pack rat and aviation history buff who must dispose of a hoard of aviation magazines. Perhaps there's another aviation historian among readers who would like to have these magazines for the cost of postage.

These magazines include *Flying* (1969–78), *Air Classics* (1972–78), *Plane & Pilot* (1974–79), and *Air Progress*. None of the years is complete

Please contact me at the address below.

Lt Col Lawrence H. Boteler, USAF (Ret.)
1709 James Payne Circle
McLean, Va. 22101
Phone: (703) 241-0575

I am a serious collector and historian of USAF air and security police memorabilia. I am interested in obtaining anything from unit patches to decorated helmet liners, fatigues, beret crests, and old photographs

Please contact me at the address below.

Paul Block
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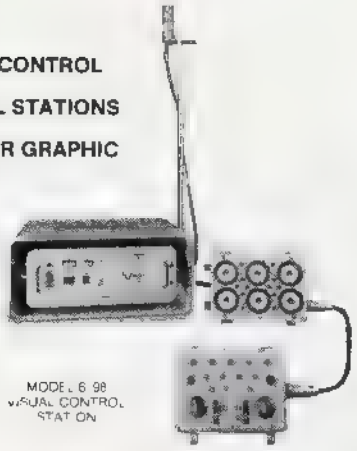

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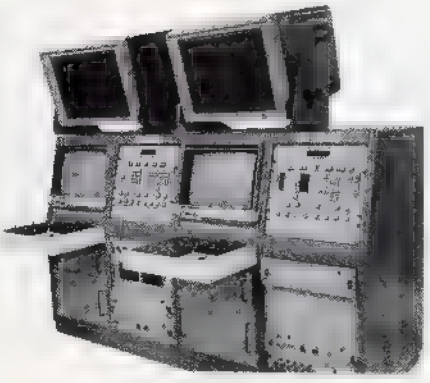

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I am a collector of military items and give talks on and display my things, but I have few Air Force items

I would deeply appreciate any donations of patches, uniforms, and especially flight helmets and gear Donations will be acknowledged, and I will reimburse shipping costs. Please contact the address below

Mike Walsh
RR 1, Box 66
Easton, Minn. 56025
Phone: (507) 787-2210

I am starting a collection of Air Force patches and insignia. I am especially interested in patches of fighter squadrons and wings

Mike Thompson
905 Evergreen St.
Hillsville, Va. 24343

I would like very much to obtain a pair of metal insignia worn on uniform epaulets by members of the Central Flying Training Command during World War II They are blue and gold and bear the inscription *Ut Viri Volent*.

Maj. T. F. Bryant, Jr., USAF (Ret.)
608 Everett Dr
Danville, Calif. 94526

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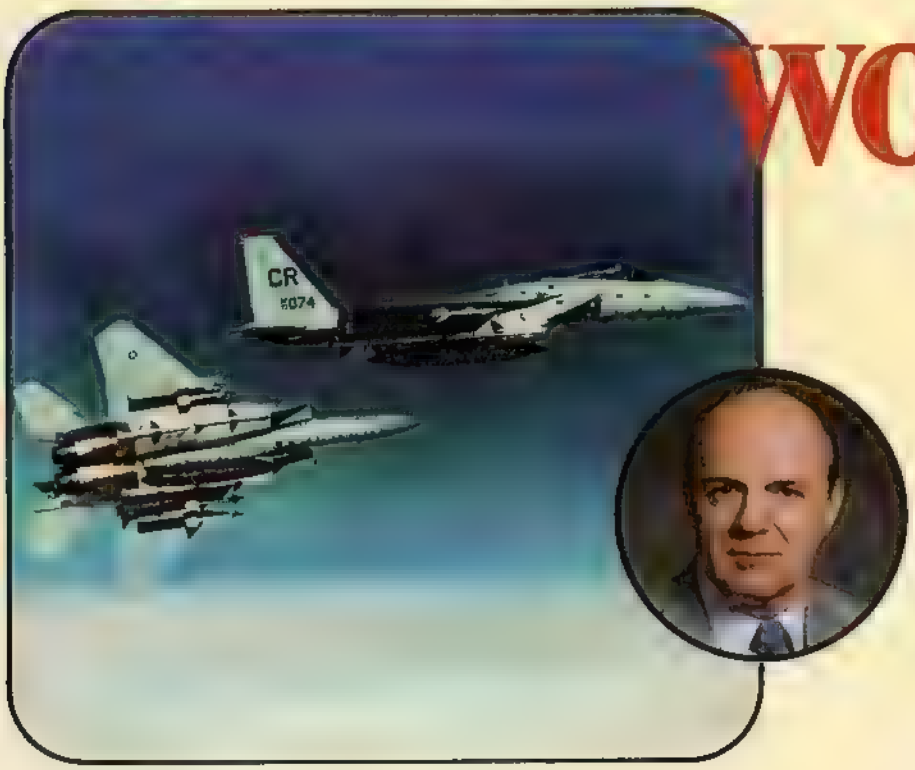

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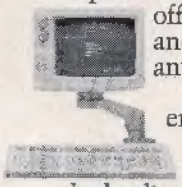

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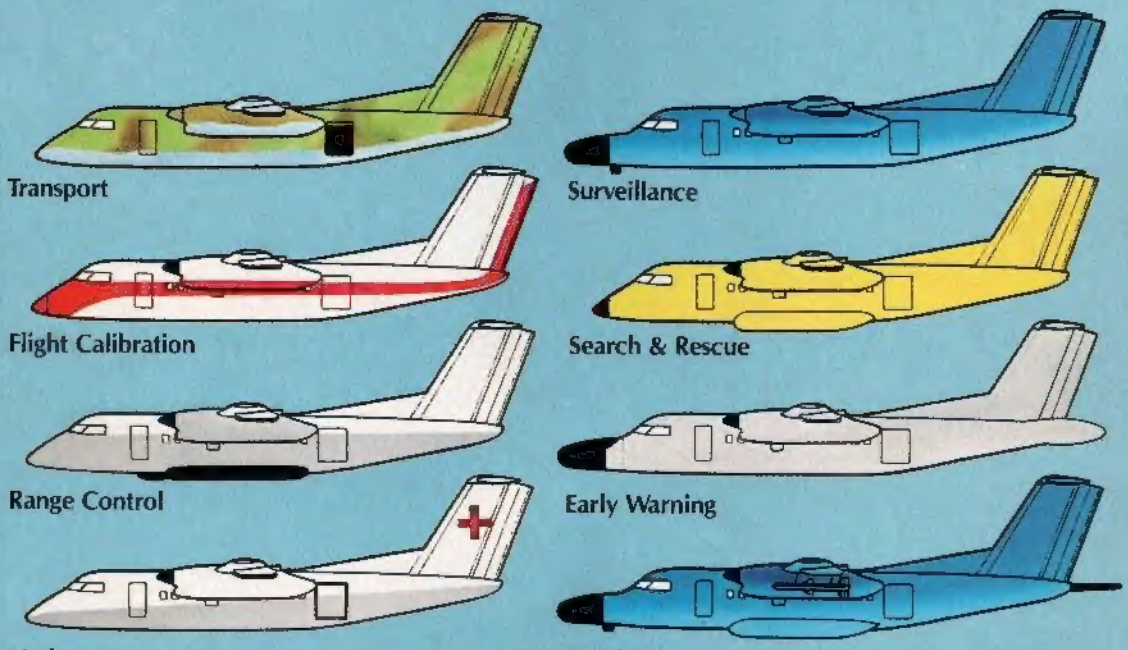

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